Safety Maintenance and Production

EST. 1901 AMERICA'S PIONEER MAGAZINE IN ITS FIELD

FIFTY CENTS SEPTEMBER, 1954

Want Exclusives?
Latest Developments?
Better Protection?

LOOK FOR

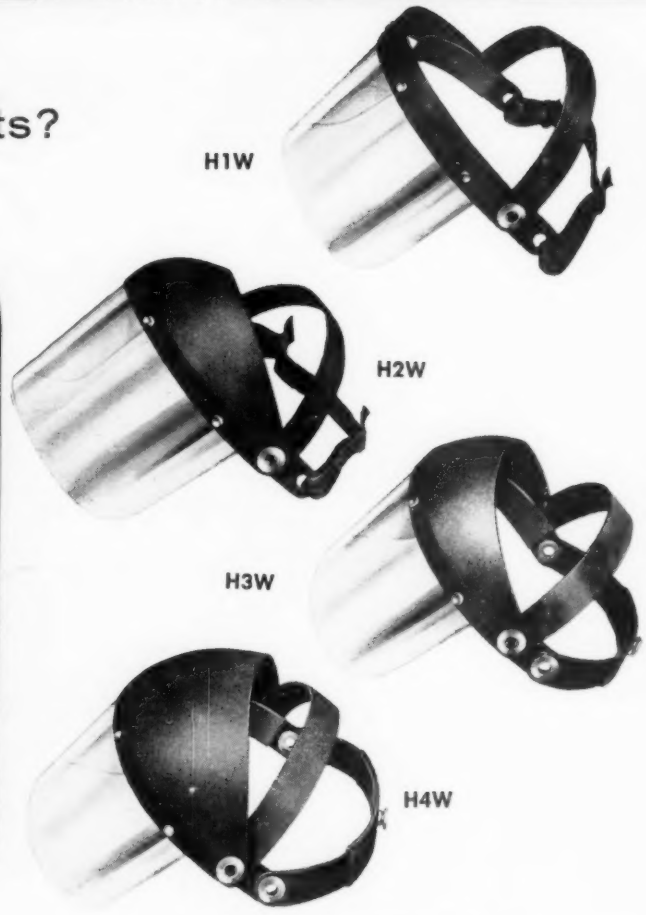
ALL 3

IN

ALL 4

NEW

AO "H" SERIES
FACE SHIELDS



AO research and engineering step forward again with several additional safety advances in facial protection for your workers! This NEW Face Shield Series features a deep spark deflector which blocks foreign particles from entering at top of face shield. Window sets out about ¾" to allow adequate clearance over nose and prescription glasses. An AO exclusive is the slot and snap fastener device which, by allowing for expansion due to heat, eliminates wear at the holes, and cracking, warping and distortion of the windows. (U. S. Patent No. 2,610,323). Another new development is the lightweight grommet-friction washer combination for permanent adjustment. Your nearest AO Safety Products Representative can supply you with these quality shields.

QUICK FACTS

Specially treated (anti-perspiration) soft, genuine leather sweatbands.

Windows easily interchangeable (simplifies handling, stocking, assembling).

Windows available in clear or green acetate, 24 mesh screen, and fibre.

For complete details on all 4 "H" Series Face Shields (H1, H2, H3, H4) write for new brochure S-2141 . . . do it to-day.

RECOMMENDED USES: For metal sawing, chemical operations, buffing, sanding, light grinding, light bulb and glass bottle manufacturing, radio and television tube exposures, bottling operations and similar eye and facial hazards encountered in industry.

American Optical
SAFETY PRODUCTS DIVISION

AO SAFETY ZONE

Keep your workers in the Safety Zone with American Optical Safety Equipment.

SOUTHBRIDGE, MASSACHUSETTS · BRANCHES IN PRINCIPAL CITIES

(For details, use Key # W-1 on card on page 75)

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the new anti-slip floor dressing

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Protect your place of business from crippling falls. Floorsafe gives your floors "Traction-Action."

Anti-slip synthetics with a high coefficient of friction are used in the manufacture of this new floor dressing discovery.

Floorsafe is approved and recommended by major U. S. insurance companies. Call, wire or write.

MYCO PRODUCTS

MASURY-YOUNG COMPANY

76 ROLAND STREET · DEPT. 55 · BOSTON 29, MASS.

BRANCH OFFICES IN PRINCIPAL CITIES

(For details, use Key # W-2 on card on page 75)

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NEOX gloves are available in 3 weights of coatings and many styles, palm-coated or fully coated to fit job requirements.

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Edmont Edmont Manufacturing Company
1256 Walnut St., Coshocton, Ohio
job-fitted gloves

THE FUTURE SHOWS

Cleveland, Ohio *Sept. 14–16*

Sixteenth Annual Ohio State Safety Conference & Exhibit (Hotel Carter). Carl L. Smith, Executive Secretary, 2073 E. 9th St., Cleveland 15, Ohio.

York Harbor, Maine *Sept. 16–17*

Twenty-seventh Annual Maine State Safety Conference. (Marshall House). A. F. Minchin, Secretary, Industrial Safety Division, Dept. of Labor and Industry, Augusta, Me.

Chicago, Ill. *Oct. 18–22*

Forty-Second Annual National Safety Congress and Exposition (Conrad Hilton Hotel). R. L. Forney, General Secretary, National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill.

Atlantic City, N. J. *Nov. 7–11*

Industrial Housekeeping Safety Guild (Eastern Sanitary Supply Group) Trade Show and Convention (Hotel Ambassador). William F. Plowfield, Executive Director, 4 S. 15th St., Philadelphia 2, Pa.

Portland, Oregon *Nov. 18–19*

Governor's Sixth Annual Industrial Safety Conference (Masonic Temple). Leonard A. Weston, Director, Accident Prevention Division, State Industrial Accident Commission, Public Service Bldg., Salem, Oregon.

Chicago, Ill. *Jan. 24–27*

Sixth National Plant Maintenance and Engineering Show (International Amphitheatre). Clapp & Poliak, Inc., Show Management, 341 Madison Ave., New York 17, N. Y.

Chicago, Ill. *May 16–20*

Materials Handling Exposition (International Amphitheatre). Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N. Y.

(For details, use Key # W-3 on card on page 75)

SAFETY GOGGLES | SAFETY SPECTACLES

FORM FITTING COMFORTABLE

WATCHEMOKET eye SAVERS

LIGHTWEIGHT EASY TO WEAR

Model 440SV Methacrylate Lens
Model 441SV Acetate Lens

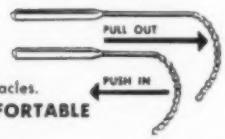
Soft Vinyl Frame

"Stac-Vent" — a new principle in goggle ventilation.
Clearer Vision . . . More Comfort . . . Greater Safety.
Large frame fits comfortably over all prescription glasses.
Lenses optically correct — shatterproof — easily replaced.
Also available with regular or screen ventilation.

Model 415

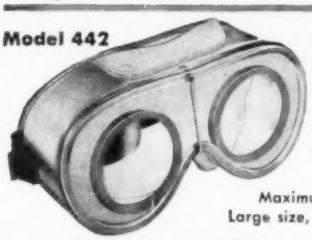
Tuc-Away

Shatterproof, optically correct lenses.
Easily replaced . . . snap-in, snap-out.
In clear, light, medium or dark green.
One size and model fits every worker.
Wearer adjusts and maintains his own spectacles.



WORN BECAUSE THEY ARE COMFORTABLE

Model 442



Soft Vinyl Frame 50 mm Round Hardened Safety Glass Lenses

Maximum protection where there is extreme abrasion.
Maximum comfort and minimum weight.
Large size, fits over all prescription glasses.

Visor-Tuc

Model 422

New Over-Eyes Protection

Almost 100% protection, plus all the comfort of "Tuc-Away". "Visor-Tuc" fits snugly against the forehead. Shatterproof Eye Savers lenses interchangeable in Tuc-Away Model.

Model 492

Welding Goggle Opaque Black Soft Vinyl Frame

Furnished with replaceable 50 mm round, Federal Specification, filter lens shades 3, 4, 5 or 6, protected inside and out by cover lenses.

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Split Joint Frame makes changing lenses a simple operation, no heating to distort frame. Retrax temple easily adjusted — One size Standard 47 mm drop eye lenses. Removable clip-on side shields available.

Quick, easy replacement of:
PLASTIC SAFETY LENSES
PRESCRIPTION LENSES
PLANO SAFETY GLASS LENSES

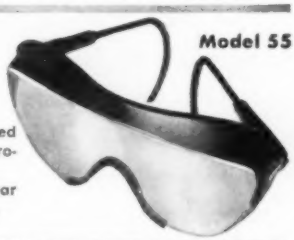
Model 99

Cheepee One-Piece Goggles

Close fitting, lightweight, comfortable.
Optically correct . . . no distortion.
Available in clear or medium green.

Methaspec Eye Shield

Model 55



Optically correct, one piece, curved Methacrylate Eye Savers Lens provides heavy impact protection.
Lens is .080" thick, available in clear or light, medium and dark green.

For details, see your Authorized Eye Savers Supplier or write direct

Quality Eye Protective Equipment ***Made by the Leaders in Plastics***

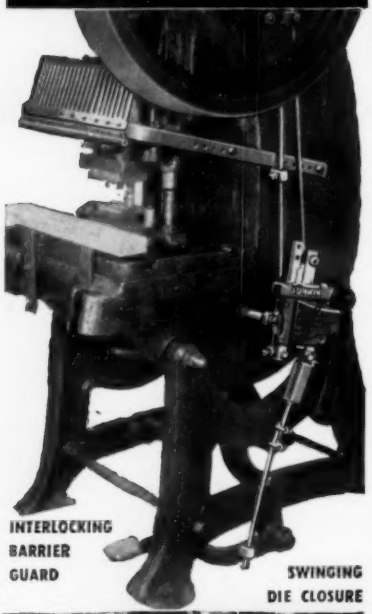
WATCHEMOKET OPTICAL CO., INC.

238 West Exchange St., PROVIDENCE 3, R. I.

In Canada: Levitt-Safety Limited, Toronto 10, Montreal 26

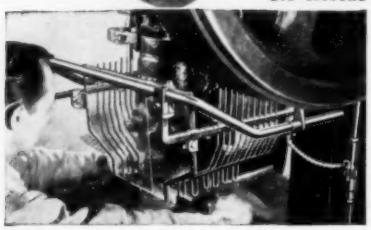
(For details, use Key # W-4 on card on page 75)

JUNKIN SAFETY GUARDS



INTERLOCKING BARRIER GUARD

SWINGING DIE CLOSURE



Your SUREST Protection Against Press Accidents

JUNKIN safety guards prevent press accidents, afford maximum protection, increase press production, lower insurance costs and generally improve plant morale. Make an investment in safety now and investigate Junkin Safety Guards for primary and secondary punch press operations. Write for free catalog "The Key to Protection".

JUNKIN
SAFETY APPLIANCE CO.
101 S. FLOYD ST.
LOUISVILLE 2, KENTUCKY

(For details, use Key # W-5 on card, page 75)

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Pittsburgh COLOR DYNAMICS

Improves Spirit of Cooperation Between Management and Workers!

● Putting color to work creates more pleasant surroundings that enhance productive efficiency and morale in new, modern plant of leading builder of heavy metal forming machinery!

THE CYRIL BATH COMPANY

Here's How You Can Get a FREE Color Engineering Study of Your Plant!

● Why not investigate what COLOR DYNAMICS will do for your plant? Send for our free book which explains what COLOR DYNAMICS is and how it works. Better still, call your nearest Pittsburgh Plate Glass Company branch and ask to have a representative give you a comprehensive engineered color study of your plant without cost or obligation. Or mail the coupon at the right.

Metal forming division, painted according to COLOR DYNAMICS, is typical of the bright and cheerful environment in the modern plant of The Cyril Bath Company, of Solon, Ohio. Designed by Dalton-Dalton & Associates, of Cleveland, Ohio.

THE PRACTICAL, everyday experiences in the modern plant of The Cyril Bath Company, of Solon, Ohio, again demonstrate how the "engineered" use of color—according to Pittsburgh's modern painting system of COLOR DYNAMICS—increases productive efficiency, reduces danger of time-loss accidents and improves the spirit of cooperation and loyalty between management and workers.

● **The Cyril Bath Company** has been a pioneer in the art of bending rolled, brake-formed and extruded metal shapes. It has developed tangent benders; radial, draw and contour formers; and press brakes. It also makes parts with this equipment. Such machinery and parts are furnished to leading manufacturers of railway coaches, automobiles, trucks, buses, jet engines, farm equipment, household appliances, structural components and many other products.

● **The benefits** resulting from the use of COLOR DYNAMICS are best summarized in the following comment of Frank J. Phillips, Sales Manager of the Bath Company:

"With COLOR DYNAMICS we have relieved eye strain, offset fatigue and lessened risk of accidents. This has increased efficiency and safety. The pleasing environment has improved the mental attitude of our working force. Loyalty and cooperation have been enhanced. The feeling of pride among our workers has resulted in cleaner work areas, simplifying our housekeeping.

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Pittsburgh Plate Glass Co., Paint Div
Department SM-94, Pittsburgh 22, Pa.

☐ Please send me a free copy of your booklet "*Color Dynamics*."

☐ Please have your representative call for a Color Dynamics Survey without obligation on our part.

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County_____ State_____

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PITTSBURGH PLATE GLASS COMPANY

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SAFETY MAINTENANCE & PRODUCTION

FORMERLY "SAFETY ENGINEERING"
EST. 1901

VOL. 108, NO. 3 **SEPTEMBER, 1954**

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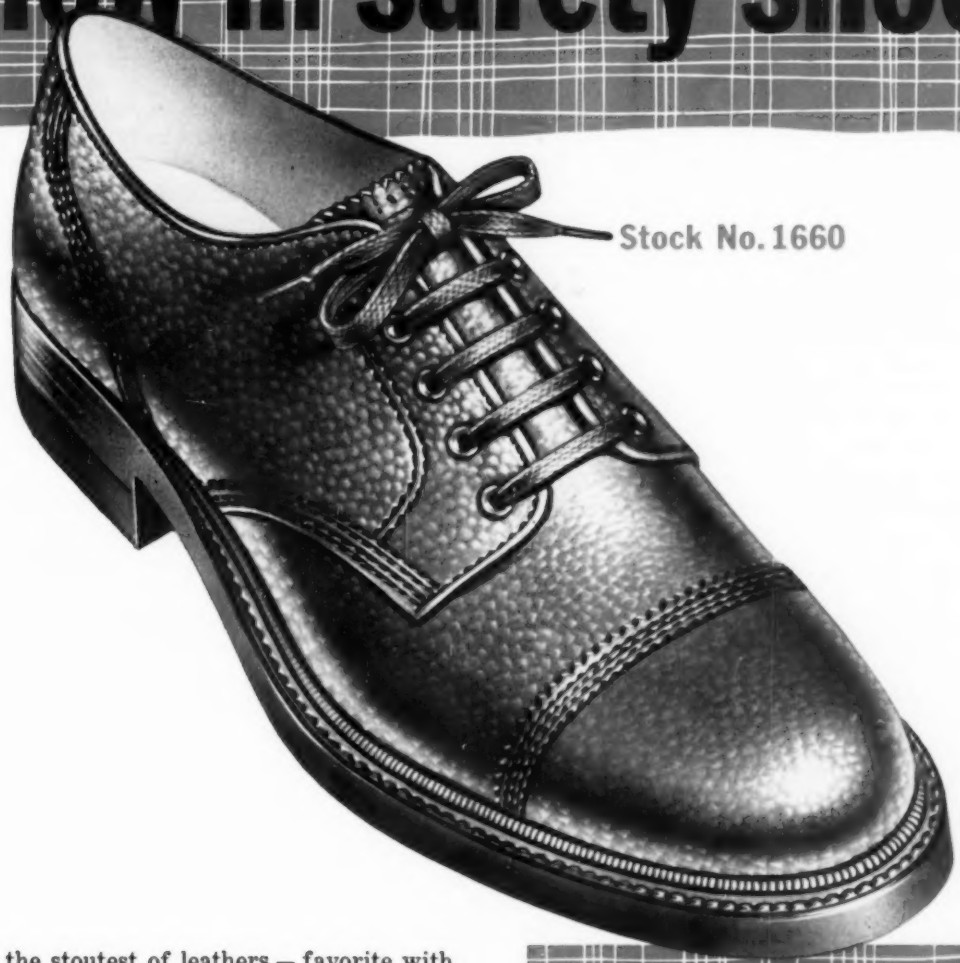
AMERICA'S PIONEER MAGAZINE IN ITS FIELD

SAFETY MAINTENANCE & PRODUCTION is indexed regularly by Engineering Index, Inc., New York

genuine Barrett

Scotch grain now in safety shoes



Stock No. 1660

One of the stoutest of leathers — favorite with most men for Fall and Winter street wear. Now Lehigh builds it into a rugged safety brogue, with zebra storm welt and triple-stitched seams — that's smart as any dress shoe sold. Put a pair on display to see what's switching more men to safety shoes than ever before in history.

LEHIGH
SAFETY SHOE COMPANY
EMMAUS, PA.

(For details, use Key # W-7 on card on page 75)

It's Safe to Say

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★ BALANCE THE ACCIDENT BUDGET

IN THIS BUDGET-CONSCIOUS DAY AND WITH OPERATION costs at a peak, it has become increasingly important to stop spending money for useless purposes and use our money for those things promising a fair return for the expenditure involved.

Balancing any budget is the surest way to live within income and thus avoid involvement in serious financial problems beyond our capacity to solve.

Since a balanced budget presupposes elimination of wasteful, unnecessary expenses, it is an appropriate time to get a clearer picture of the tremendous drain caused by accident costs. Unlike personal extravagances, we need not be the victim of an accident to share in the costly losses of preventable accidents.

Let us apply the budget test to the accident cost. Are accidents necessary? Are they "inevitable"? Are they profitable? Are they worth the price? Any normal person would reply negatively to all those questions. For years, management has known that no one honestly can make money through an accident. The loss is far greater than any possible gain and victims of innumerable accidents are unanimous in their thinking that they would have been better off without an injury. Certainly, no compensation schedule yet devised can replace full wages and physical suffering is beyond computation.

The average man in the street does not realize the stupendous sums of money entailed by accident costs. It is difficult for the imagination to encompass a sum of nine billion dollars, except in what that figure would buy. And yet, that is the financial loss to our nation at the very time we must make unprecedented expenditures for our national defense and still hope for a greater reduction in back-breaking, incentive-stifling taxes.

Universally accepted experience has shown that virtually all accidents are preventable. Safety measures, use of protective products and devices, elimination of danger spots and cooperative safety effort can, and has repeatedly, cut the accident cost.

For example, suppose a plant had to expend nine thousand dollars last year on account of accidents. That item should appear as an expense just as any other. Now we have nine thousand dollars on the budget to be provided for on account of accidents which we all agree are undesirable, unprofitable and by every rule of reason, a complete waste. That item of expense can and should be eliminated from the budget.

It is not enough to set up an accident report describing the details of an occupational casualty. A detailed study should be made to show every dollar of expense of the accident to give a true picture of the accident expense item. If, for instance, three thousand dollars of the accident cost is attributable to unsafe conditions, lack of protective equipment or unguarded machines, that lack should be entered on the budget as a necessary, indispensable item.

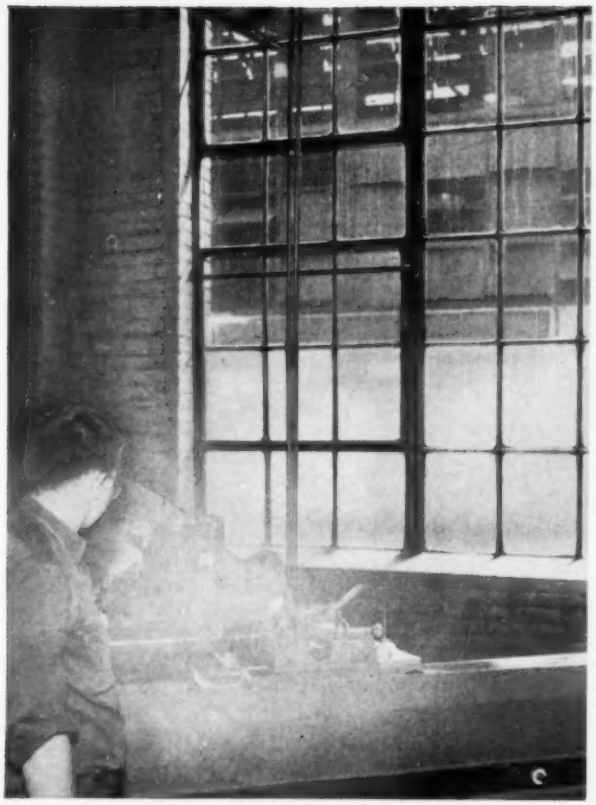
There is a vast difference between accident cost and accident prevention cost. The former is pointless and destructive. The latter is constructive and profit-making. No one yet has ever heard of the expenditure of a single dollar of accident cost to be regarded as a profitable investment or expenditure.

If we do not include on the budget the cost of accidents suffered in the plant, we are deluding ourselves, and invite a rude awakening at the end of the year when we evaluate expenses and income.

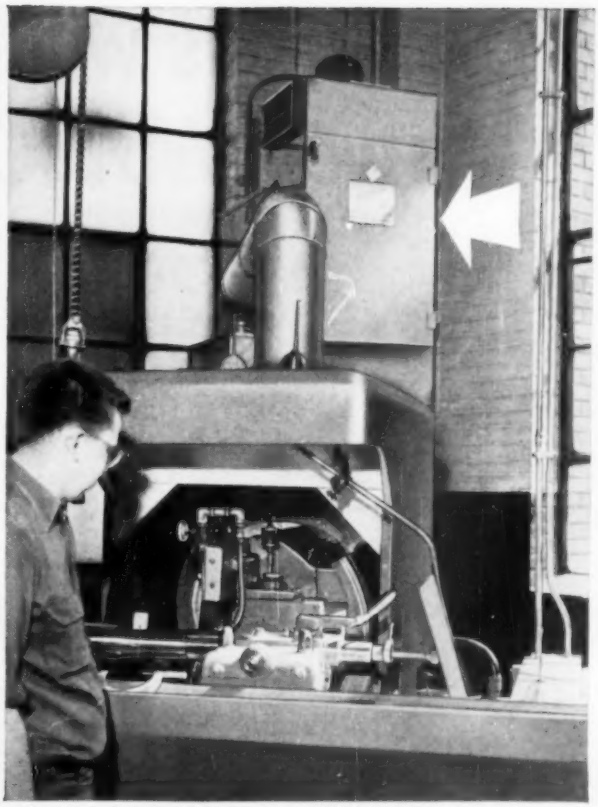
There is a national cry at the moment for a reduction of expenses. From the operation of the Federal government on down, expenses are out of all proportion to income, high as it is at this time. Why don't we dramatize an item representing a loss of billions a year—surely, it is big enough to concern us all in our plea for reduced spending!

It behooves us to institute a careful survey of this wasteful, burdensome accident cost which, while often hidden from direct view, is a staggering drain on our resources. It is time that this destructive tax be struck from our budget.

Every individual carrying insurance is paying in the premium a part of the accident tax. Victims of accidents are paying a still higher tax. If we intend to escape from the heavy load of accident expense, we all must pursue the means for cutting down accident frequency. We can help balance the budget, personal, professional and national, by resolving that every act of carelessness, recklessness and indifference to safety takes from us every year tens of thousands of lives and billions of dollars in money. H. A.



Before installation of Precipitron Oil Mist Control, this high-speed grinder developed as much as 10 gallons of oil mist in a single shift. Result: menace to workers' health . . . fire hazard . . . efficiency depressant.



After installation of Precipitron Oil Mist Control, oil mist from the same high-speed grinder is no longer a problem. Precipitron traps the extremely small particles of oil, dirt and smoke—*electronically*—leaves air clean, safe.

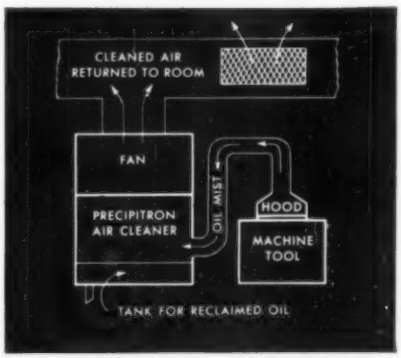
Westinghouse PRECIPITRON® Eliminates Coolant Oil Mist as Hazard . . . Pays For Self Through Upped Efficiency, Fuel Savings

Electronic air cleaner more efficient, economical than mechanical air filtration.

Westinghouse Precipitron Oil Mist Contrql is the positive way to free your plant of dangerous, costly oil mist. Precipitron improves visibility, boosts operating efficiency, eliminates hazardous working conditions, strengthens employee morale—*and pays for itself at the same time!*

Present installations show savings of thousands of dollars yearly, directly in fuel, housekeeping expenses and salvaged cutting oil, indirectly in increased efficiency.

Get full details about Westinghouse Precipitron Oil Mist Control now. Call your local Westinghouse-Sturtevant office, or write Westinghouse Electric Corporation, Sturtevant Div., Hyde Park, Boston 36, Mass.



Here's how Precipitron works: Collection hoods catch oil mist at source. Quiet, efficient Westinghouse fan units draw coolant-laden air through Precipitron air cleaners—oil, smoke, fumes are completely trapped. Operating cost: pennies per week.

WESTINGHOUSE AIR HANDLING

YOU CAN BE SURE... IF IT'S Westinghouse J-80423

(For details, use Key # W-8 on card on page 75)

Your Workers will be proud to wear WINGUARD Safety Shoes

IN 19 STYLES
A STEEL TOE FOR EVERY SAFETY PURPOSE

Appearance, of course, isn't everything but you'll be amazed how it will help you to persuade your workers to protect their priceless toes with safety shoes.
While it is true we have 19 different styles of austempered steel toes available, WINGUARDS are by far the most popular for styling your safety shoe requirements.

Safety Box Toe Company

812 STATLER BLDG. • BOSTON

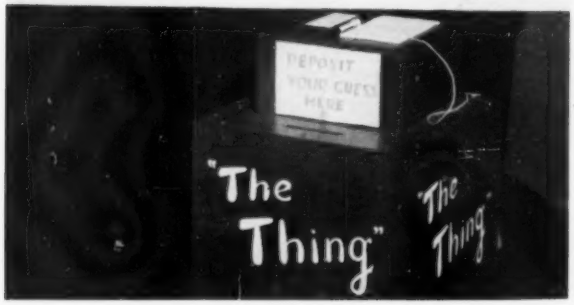
SELLING AGENTS: BECKWITH MANUFACTURING COMPANY, DOVER, N. H.

WRIGHT-GUHMAN COMPANY, ST. LOUIS, MO. BECKWITH BOX TOE, LTD., SHERBROOKE, P. Q., CANADA LENNART LJUNGQVIST, TIBRO, SWEDEN

(For details, use Key # W-9 on card on page 75)

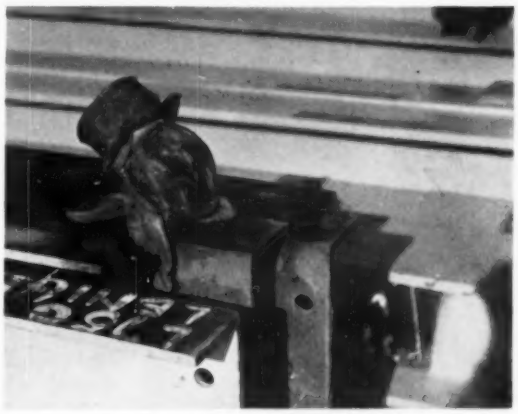
By GEORGE J. NEUMANN
Vice President and Plant Manager
Lehigh Structural Steel Company
Allentown, Pennsylvania

Can a Safety Contest Save . . .



. . . a worker's Eye?

or his Hand?



or his Foot?

SAFETY CONTESTS HAVE LONG been recognized as worth something in terms of greater employee interest and participation in industrial safety programs. To most management men faced with deciding whether to authorize a safety contest, the basic question is not whether *any* good will be accomplished, but *how much* good.

They want to know, "Will we get enough returns in the form of lower frequency and severity rates to justify running a contest, or should we try something else instead?" The answer to that question at our company is that contests are very much worth while.

Here is the record: From October, 1939 through October, 1953 there have been 100 months when we have not had safety contests. Our frequency rate during those 100 months averaged 6.01 lost-time accidents per million man-hours worked, and our severity rate was 1.100 days lost per thousand man-hours worked.

We actually conducted safety contest programs during 68 months of those same 14 years. When we were running safety contests our frequency rate averaged 3.45 and our severity rate averaged 0.615.

So during the safety contest months our frequency rate was nearly 43 percent below the period when we were not stimulating employee interest by contests, and our severity rate was 44 percent lower. Actually, however, the showing is even better than that. Between October 1953 and the writing of this article we have worked 217 consecutive days without a lost-time accident, although this record is not included in the average shown above.

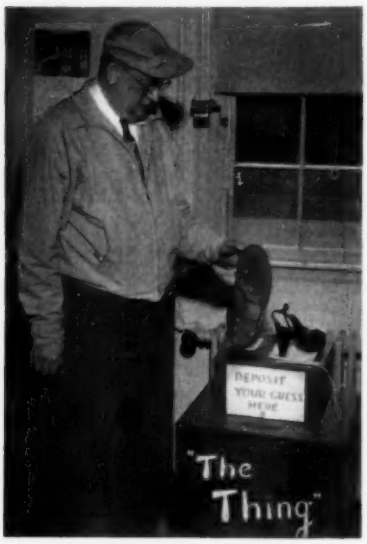
This experience, while indicating the effectiveness of safety contests, should not be taken to mean that

contests automatically improve safety records. First must come a period of establishing the proper "climate" so that contests will work. This may take a year or two.

Lehigh Structural's safety record has not always been as good as it is today. In fact, it used to be terrible. We began to keep records on frequency and severity in 1924, about 5 years after the company was founded. For the period 1924 through 1927, our accident frequency rate was 61.3 per million man-hours worked, and the severity rate was 7.35 days lost per thousand man-hours worked. Management would not tolerate such a situation, and took decisive steps to improve safety performance.

We did not hold safety contests at first. More intensive safety education efforts, and constant vigilance to maintain good housekeeping and safety conditions throughout the plant, however, brought about a marked improvement. From 1928 through 1931 the frequency rate averaged 13.7—only about one-fifth as much as in the 1924–1927 period. Severity rate dropped down to 0.98, an even greater improvement.

Then from April 16, 1931, to October 30, 1939, a period of 8 and a half years, we had no lost-time accidents. We are still proud of this record, but it had one unfavorable effect on our continuing safety program. It lulled us into the false feeling that we had licked our safety problem and that all we had to do was keep on the way we were. During the long accident-free period we gave all employees a reward for working safely at the end of each year without a lost-time accident. The awards, which ranged from safety kits and pen knives to suede jackets, were made to reward a good safety performance just completed, rather than to stimulate a new one.



WHAT WAS IT?—When the box on page 11 was opened the mysterious objects turned out to be improper working footwear. Closest guessers were rewarded with prizes.

Short-Term Contests

During the 3 years immediately after the long period without accidents we had 10 lost-time accidents. Finally it dawned on us that we had to do more than pass safety banners between departments, fly safety pennants when we had no lost-time accidents and lower them to half mast when we had. We had to do more than just talk safety and reminisce about past achievements.

After many pro and con arguments as to the value of safety contests, our company safety council decided an award made once a year was not effective enough for everyday needs. Besides, since it had been 3 years since we had a year without a lost-time accident, nobody was getting an award anyway. This was discouraging and frustrating to employees.

So, at a time when our frequency rate was 4.47 and our severity rate stood at 0.0823 we changed our policy from making an award ***after*** a record was established to making an award to ***establish*** a record. We started safety contests. A contest with war savings stamps for prizes was run in July 1942, and another in November 1943. Our frequency rate dropped to 0.95 and the severity rate stayed virtually constant at 0.0823.

Then we were flooded with war work. Employment tripled, women were hired, and we operated 3 shifts, 6 or 7 days a week. Although we continued our normal safety activities, safety contests as such were eliminated. Whether or not the elimination of contests was the cause, the fact remains that our frequency rate jumped to 7.867 and the severity rate to 1.4552.

In August 1949, when our frequency rate had fallen back to 5.13 and the severity rate to 0.1395, we resumed our safety contest program. The first type of contest was called "Safety Poker." At the beginning of each week, each employee received an ordinary playing card with the week's safety slogan and his name, check number, and social security number imprinted on its back. Each week the names of all employees were put into a hat, and 20 were drawn. The first 10 individuals whose names came out of the hat were then interviewed. Those who knew the week's safety slogan without looking at their playing card received a cash prize of one dollar. If the employee had his playing card with him when he repeated the slogan, he received an additional dollar. Wearing safety shoes and safety glasses when he repeated the slogan meant a two dollar bonus for the employee.

If any of the first 10 employees chosen failed to answer correctly, names were taken from the alternate list until 10 winners were found. At the end of 5 weeks, each employee had 5 cards—a poker hand. Those holding the 4 highest hands won 4 "showdown" prizes. Savings bonds and safety shoes were awarded as prizes. Not missing a bet, the safety committee saw to it that posters and public announcements made everybody well aware of the contest and that an extensive display of safety shoes linked their sale to the contest.

The next safety contest was directed at the families of workers as well as at the workers themselves. Each month a safety slogan submitted by an employee, who received a cash award for his slogan, was circulated throughout the plant. The slogan reached workers' families through the plant publication which was sent to their homes. Again, 10 names were drawn each month and, if there were home telephones listed

(Continued on page 64)

ONE SAVED . . . HOW MANY MORE?

By JACOB TWERSKY

I WAS LUCKY; it took 8 years for the curtain to come down over my eyes, 8 years during which I learned how not to see.

When total blindness finally shut out my sight at the age of 12, I was prepared, or at least as prepared as anyone can be for living in a completely sightless world. Colors became a matter of memory . . . faces became voices . . . sounds became the only pictures I would ever know. The horizon itself shrank to the tips of my fingers.

Since that time, many years ago, vision has become something very precious to me, perhaps all the more precious because it is only something to remember. After World War II, I worked with veterans blinded during combat, and discovered the shattering effect on men of losing vision without even the warning I had. Life went on for these men, of course; but it was a new and difficult life that tested every resource of courage and strength.

I have discovered, however, that combat is not the only way blindness strikes violently. Men during peacetime, earning a livelihood for themselves and their families, have

About the author

Jacob Twersky, an instructor of history at the City College of New York since 1948, began losing his vision at the age of 4 as a result of scarlet fever. When he was 12 years old, he became totally blind.

Despite his handicap, Mr. Twersky has led a full and active life. While still an undergraduate at City College, for example, he became New York State lightweight wrestling champion. After graduation, he took his M.A. at Columbia University, and PhD at New York University.

Before teaching at City College, Mr. Twersky served for two years as Orientation Instructor and Counsellor of the Blind at the Bronx Veterans' Hospital. His talks and addresses on eye safety to various industrial groups have graphic power.

lost their vision in a single, shattering instant while on the job—often at the very operation they had done safely for years. Because of my first-hand concern with blindness and its impact on human beings, I have taken a vital interest in the problem of industrial blindness.

Industrial Hazards

Here are the facts as reported by the National Society for the Prevention of Blindness: every year, 300 thousand eye injuries occur in American industry, many resulting in permanent vision damage or blindness. Steelworkers, carpenters, painters, chemists, machinists—even executives inspecting working areas—are victimized by eye injuries. The problem, however, reaches far beyond the men themselves. The impact on their families is enormous. From the standpoint of the employer, medical and compensation costs send industrial insurance payments soaring. This may well affect the cost of the product, which in turn affects the entire community of consumers. Valuable man-hours of production are lost, and plant morale is hurt. The total cost in financial terms to the employer, worker and community runs into the millions of dollars. Of course, the loss to the individual worker blinded by a split-second mishap can never even be described.

What can be done about this tragic waste of human and material resources? For one thing, we must do away with the dangerous idea that industrial blindness is something inevitable. Far too frequently, management—and just as often, ***workers themselves***—seem to approach the problem of vision hazards from the standpoint of fatalism. Old Pete on the job shrugs and says: "If my number is up, it will happen." The Man in the Front Office talks about "the nature of the operation," but really is facing (or avoiding) the problem just as Old Pete does when he places all responsibility for protecting his eyes on Lady Luck.

In many ways, both the Man in the Front Office and Old Pete remind me of the pessimists who always call blindness "inevitable." These solemn people once pointed to eye diseases such as cataract, trachoma and babies' sore eyes as "the hand of fate." Luckily, however, there were other people who went to work, and as a result, trachoma and babies' sore eyes have been practically eliminated. Cataract itself is rapidly being stopped as a cause of blindness by advances in modern surgery.

This is the essential point: by taking determined action against eye accidents—just as against eye diseases—thousands of cases of blindness can be prevented, at tremendous savings to industry, the worker, and the community. In terms of industry, this action can be accomplished by maximum safety programs to prevent eye accidents in the first place, and by ***maximum eye protection to prevent blindness or serious injury even when mishaps do occur.*** Of all possible vision damage, industrial blindness is the most needless, since more than 95 percent of eye accidents can be prevented by the right protective equipment if it is worn while on the job.

Wise Owl Club

The history of the Wise Owl Club of America is a practical demonstration of how eye protection pays concrete dividends to employees and employers alike. Many readers have probably heard of the Wise Owl Club, the fastest growing eye safety organization in the United States. There are now more than 6 thousand members of the club in every state of the union. These 6 thousand men and women are still productive workers because they are able to use their eyes, one or both of which would have been destroyed if not for the fact that they were wearing safety goggles at the time of an on-the-job accident.

One of the biggest problems of safety men, as I understand it, is selling safety on a continuing basis to the man at the machine. Posters, pamphlets, even speeches, represent efforts to drive home safety consciousness on the part of the individual worker. Each of these methods, however, lacks something essential—and that "something" is living proof of safety results. As a selling tool, the Wise Owl Club is unsurpassed. Each member of the club, wearing his Wise Owl pin at his job, becomes a salesman of safety, providing an immediate, vivid example to his fellow workers.

Eye Safety Means Real Savings

The nonprofit Wise Owl program, in terms of industrial wealth, has already saved $25,564,600 in compensation costs alone. As a specific example, the eye safety action of one company (now enrolled in the Wise Owl Club) prevented the loss of 85 eyes, a minimum compensation savings of $300,000. For the workers themselves, of course, the gain can be summed up quite simply: the difference between a shattered pair of safety goggles, and a shattered life.

Perhaps because of my own situation, I know how ruthless an enemy blindness can be. But blindness is more than an enemy to individuals; it is a foe to the strength and resources of our nation. American industry is vital to America's survival, and anything which weakens our industry necessarily weakens our nation and the entire free world. Needless eye injuries—300 thousand of them every year—represent a sapping of industrial strength and production. These injuries must be fought, and "secret weapons" are not necessary. The chief weapon we must use is simply the right eye safety equipment for every man and woman, every worker and every executive, in every working area where blindness may strike through industrial accident.

Picture by courtesy of the National Society for the Prevention of Blindness.

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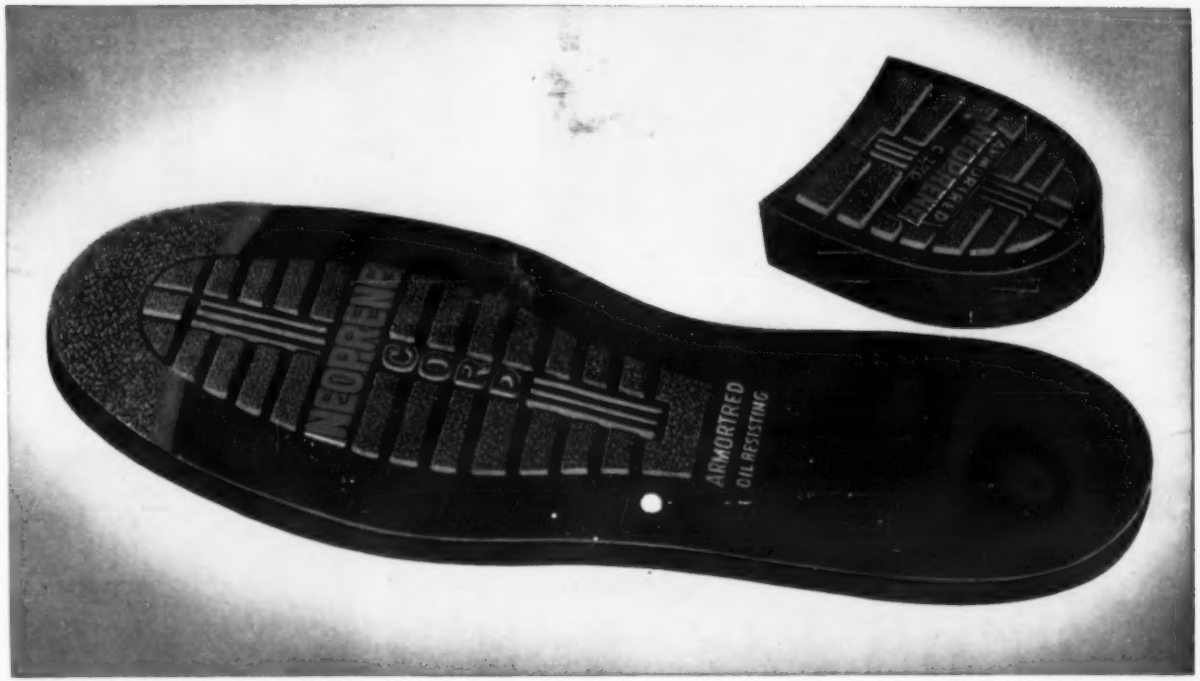

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By WALTER E. MONTGOMERY
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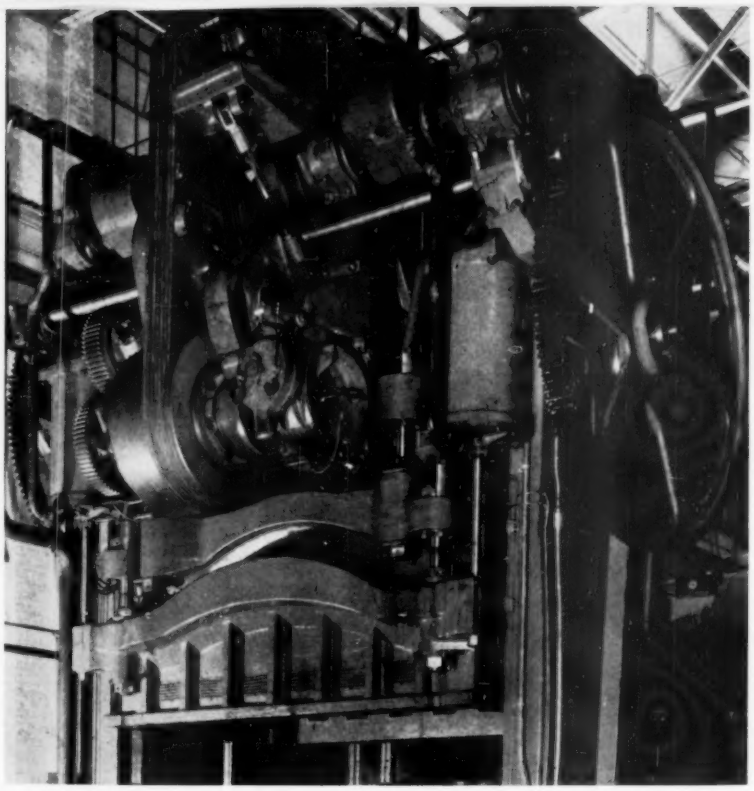


What You Must Know To Guard a Machine

SEVERAL YEARS AGO a series of articles appeared in The British Journal of Industrial Safety, written by Henry A. Hepburn, B.SC., her majesty's deputy chief inspector of factories, London, England. These articles were based on an analytical study of thousands of accidents that involved machinery or mechanical motion.

The age old question, "to guard or not to guard," that has plagued safety engineers the world over has, to my mind, been answered. Guarding of machinery has been placed on a more exact basis, hit or miss measures have been eliminated and order has been brought out of chaos by these articles.

To be adopted effectively by industry and manufacturers, machine guarding should follow fundamental lines of reasoning just like any other science. We all know that safety can't be measured wholly in terms

of mathematics, but we cannot deny that there is a high degree of vulnerability operating a machine.

The principles here will go a long way in convincing industry that safety engineers can speak with one mind and do not have to wait for a serious occurrence to prove that a situation or condition should receive attention.

One of the most marked trends in recent years has been the steady reduction in the percentage of injuries

MACHINE GUARDING SERIES
next article in October

1. Know the machine's dangerous parts
2. Know how to guard it
3. Know how to teach machine safety

caused by machinery. Twenty-five years ago, a quarter of all reportable accidents came under this heading. By 1945 the figure had fallen to less than 15 per cent.

It would be wrong to assume, however, that the guarding of machinery has now ceased to be a major safety problem. On the contrary there are still excellent reasons why machine guarding must still be regarded as one of the most important branches of industrial safety work. That the number of such accidents has been reduced is due to the efforts made over a period not of years but of decades, and any slackening of those efforts will assuredly be followed by a sharp rise in the figures. Moreover, the figure of 15 percent takes no account of the severity of these accidents.

Objective of Guarding

The standard of machine guarding, including guard maintenance, is still not what it should be and the fact that so much has been accomplished must not blind anyone

to the fact that there is still much more to be done before machinery accidents cease to be a major problem.

The ultimate objective in the safeguarding of dangerous parts of machinery is to ensure the absolute immunity from injury of each person employed at or near machinery of all kinds. From a practical point of view that may seem idealistic but if such a viewpoint is accepted as a basis of constructive reasoning, it will enable some fundamental guiding principles to be established.

Complete immunity from accidents will never be achieved by safe guarding alone, since an accident on machinery is caused by the combination of two actions: that of the dangerous parts (the material factor) plus that of the person injured (the personal factor).

An accident may be of an entirely fortuitous nature; or the result of carelessness, or zeal, or foolishness, or just plain disobedience. Human action is so unpredictable that principal reliance for safety must be placed on secure guarding and secondly upon training and education in accident prevention. The two are essentially complementary, neither alone can give immunity from accidents. Each must be given attention in every accident prevention program.

Bill Heinrich has estimated, by statistical research into the frequency of potential injury accidents, that in a group of 330 accidents of the same kind, using the word "accident" as an occurrence that would give rise to an injury, if the personal factor coincides with the material factor—300 result in no injuries, 29 result in minor injuries and 1 results in a major or lost time injury.

It is a matter of chance whether or not the serious injury accident happens at the first occurrence of the accident-causing event or at some repetition of it. But the inference is clear that a serious accident inevitably must occur, if the unsafe practices are continued for a sufficient number of times, the average of which, over a wide sample of operations, has been found to be 330.

That is called the law of averages. It is an inexorable law that is always enforced, everywhere. It is no man-made statute. It cannot be repealed. Under it no tickets are torn up, no fines are remitted, and no sentences suspended.

Under the terms of this law there won't be an accident every time a worker violates a rule or commits an unsafe practice; nor will there be a death or serious injury. But a certain number of violations mean one accident, a certain number of accidents mean one injury, a certain number of injuries mean one death. Such is the law of averages. That is the certain part of it.

The Time Element

This law is no respecter of persons. Skill, coupled with safety training, modifies the time element inasmuch as the man may lapse from safe practice once a month. Thus the average risk of one serious accident and 29 minor accidents instead of being packed into 330 days, will be extended to cover 26 years. But inevitably a serious accident will ultimately occur, with minor injuries during that time.

Immunity from accident over a period of years is therefore no proof that an unguarded machine is not dangerous. The conclusion is that if parts of a machine are intrinsically dangerous, their danger must be eliminated, since no reliance can be placed upon the personal factor. The first principle of safeguarding is therefore: The Principle of Inevitability: ***An injury-producing accident will inevitably occur to a person employed on a machine having parts which experience has proved to be dangerous and which is normally used with those parts not securely guarded.***

The juxtaposition of a worker to moving parts of power-driven and other machinery is necessary for production. When any person is put to work at a machine an experiment in danger is arranged which will demonstrate whether or not that machine is safe. Over the years statistics have been kept and analysed, and so definite are the deductions that can be made from these records that there is no longer any justification for exposing any person to risk on an unguarded machine. From this can be formulated the second principle of safeguarding: The Principle of Intrinsic Danger: ***Certain parts or combinations of parts are intrinsically dangerous in that they have caused accidents in the past, are causing them at the present time, and will continue to cause them in the future.***

(Continued on next page)

From the records and accident experience it can be definitely stated the following parts or combination of parts of machinery are intrinsically dangerous—

*1. **Revolving shafts, spindles, mandrels and bars.*** (Machine shafts; sensitive drilling machine spindles, chucks and drills, etc.; larger drilling machine spindles; boring bars; stock bars; traverse shafts on milling machines; etc.)

*2. **In-running nips between pairs of revolving parts.*** (Gear wheels; friction wheels; calender rolls; mangle rolls; metal manufacturing rolls; rubber washing, breaking and mixing rolls; etc.)

*3. **In-running nips of the belt and pulley type.*** (Belts and pulleys, plain, flanged or grooved; chain and sprocket gears; conveyor belts and pulleys; metal coiling; etc.)

*4. **Projections on revolving bars.*** (Keyheads, set screws, cotter pins, coupling bolts, etc.)

*5. **Discontinuous rotating parts.*** (Open arm pulleys, fan blades, spur wheels, etc.)

*6. **Revolving beaters, spiked cylinders and drums.*** (Scutchers, rag-flock teasers, cotton openers, laundry washers, etc.)

*7. **Revolving mixer arms in casings.*** (Dough mixers, rubber solution mixers, etc.)

*8. **Revolving worms and spirals in casings.*** (Meat mincers, rubber extruders, spiral conveyors, etc.)

*9. **Revolving high speed cages in casings.*** (Hydro-extractors, centrifuges, etc.)

*10. **Abrasive wheels.*** (Manufactured wheels, natural sand stones and others.)

*11. **Revolving cutting tools.*** (Circular saws, milling cutters, circular shears, wood slicers, routers, chaff cutters, etc., hog fuel machines.)

*12. **Reciprocating tools and dies.*** (Power presses, drop stamps, relief stamps, hydraulic and pneumatic presses, bending presses, hand presses, revolution presses and others.)

*13. **Reciprocating knives and saws.*** (Guillotines for metal, rubber and paper cutting; trimmers, corner cutters, perforators, etc.)

*14. **Closing nips between platen motions.*** (Letterpress platen printing machines, paper and cardboard platen machine cutters, some power presses and similar adaptations.)

*15. **Projecting belt fasteners and fast running belts.*** (Bolt and nut fasteners; wire pin fasteners and the like; woodworking machinery belts; centrifugal belts; textile machinery side belting, etc.)

*16. **Nips between connecting rods or links and rotating wheels, cranks or discs.*** (Side motions of certain flat bed printing machines, jacquard and other automatic looms, and various other machines.)

*17. **Pawl and notched wheel devices for intermittent feed motions.*** (Planer tool feed motions, power press dial feed tables, etc.)

*18. **Nips between reciprocating and fixed parts, other than tools and dies.*** (Metal planer reversing stops; sliding tables and fixtures; cotton spinning mule carriages and back stops, pillars, etc.; shaping machine tables and fixtures; tool steady guide and steady arm on turret lathes, etc.)

*19. **Nips between revolving control handles and fixed parts.*** (Traverse gear handles of lathes, milling machines, etc.)

*20. **Moving balance weights and dead weights.*** (Hydraulic accumulators, counter balance weights on large slotting machines, etc.)

*21. **Nips between revolving wheels or cylinders in pans or on tables.*** (Sand mixers, edge runners, crushing and incorporating mills, dough brakes, mortar mills, leather currying machines, etc.)

*22. **Cutting edges of endless band cutting machines.*** (Wood-cutting band-saws, log-cutting band saws, metal-cutting and stone-cutting band saws, cloth-cutting band knives, etc.)

*23. **Nips between gears and rack strips.*** (Inker roller drives on L.P.P. and lithographic machines, some planing machine drives, etc.)

*24. **Revolving drums and cylinders—uncased.*** (Tumblers in the foundry, shaking barrels, barrel type dough mixers, varnish mixers, rag digesters, etc.)

*25. **Nips between fixed parts and unidirectional moving parts.*** (Bucket or hoppers of conveyors against tipping bars, stops or part of the framework.)

The reference to machines or use given in each group are typical for each and, of course, are not exhaustive.

Fallacy of "Inaccessibility"

In the assessment of the degree of danger likely to be encountered with any group of dangerous parts it is advisable, for absolute safety, to disregard associated functions such as rate of revolution, velocity of sliding parts, and frequency of approach to parts. Experience has shown that, given intrinsic danger, an accident will inevitably occur if the required combination is repeated a sufficient number of times.

It should be noted that danger arises only when a personal factor is introduced. Accordingly, there should be a method of removing one factor in the accident equation. That is to put the dangerous parts out of reach, i.e. to presuppose that safety will be obtained by position, which is legally allowed.

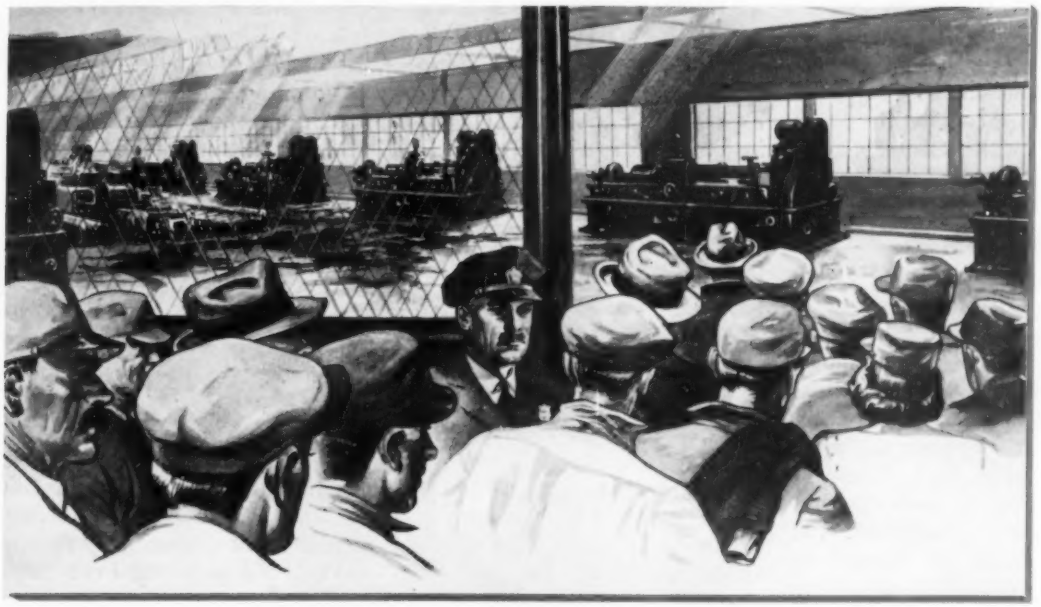
Unfortunately, experience has demonstrated that unthinking, young, or untrained persons can make access to dangerous parts, often with considerable difficulty, thus destroying positional safety and introducing the personal factor to the dangerous material factor. For this reason the ***adoption of safety by position cannot be accepted as a means for securing absolute safety.***

For absolute immunity from accidents, reliance must be placed on positive predictable measures—on the control of the material factor which definitely means elimination of all dangerous parts. These considerations lead to the third principle of safeguarding: The Principle of Non-Reliance: ***In the assessment of the degree of danger associated with any dangerous parts of machinery, no reliance should be placed upon the co-operation of***

(Continued on page 27)

By WOODROW A. JAFFEE
Floor Maintenance Consultant
Oil-Dri Corporation
Chicago, Illinois

Don't Send Them Onto a *SKATING RINK* . . . . . .



IN ALL TYPES of industry, it is important for floors to permit safe and rapid movement of personnel and products, and safe operation of machinery. In many plants the very lubricants, coolants, and other liquids——essential to manufacturing operations——make a hazard of the floor. Deposits of these liquids on floors cause serious slipping accidents and flash fires which have destroyed plants or caused a costly work stoppage.

Then too, frequent deposits of oils or other liquids often ruin the floor surfaces, whether they are concrete, wooden block, or asphalt; particularly when the surfaces are subject to rapid movement of heavy loads.

In addition to fire hazards and floor damage, slipping hazards from oil deposits on traffic surfaces endanger workers. National statistics on "falling" accidents and fires, and

compensation and fire insurance costs emphasize the importance of these dangers.

Oil absorbents can help considerably to eliminate or reduce these floor problems. These absorbents are non-flammable, non-slippery, chemically inert, and have absorbent qualities which solve a host of floor housekeeping problems. They are economical and simple to use and are safe for personnel and machinery.*

In the paragraphs that follow, techniques will be laid out for handling absorbents on various types of floors. Let's first consider the plants where occasional spills of liquids are likely to occur.

Spilled Liquids

Where occasional spills of oils, fats, or greases create danger, cover them with a spread of an approved oil absorbent. Dangers of slipping or fires instantly will be reduced, as well as the caustic effects of acids. Enough material to cover the liquid deposit should be applied—usually a layer one-eighth inch to one-quarter inch thick is sufficient. The absorbent should be allowed to remain long enough to absorb all the liquid. Absorption can require a few seconds to several minutes depending on the liquid. Because of the chemically inert properties of the better absorbents, there is no hazard in leaving them on the floor until it is convenient to brush them up for disposal. For maximum economy, absorbents should not be disposed of until they become dark-colored, indicating saturation. They should be saved in containers for re-use until fully saturated.

Another floor problem, quite common, is that of the industrial plant where oils and other liquids are continually seeping onto the floors, spraying the floors, or dripping from materials being transported from one department to another. Next to the base of machines which seep oil, absorbents should be banked about one and one-half inches high and about one inch wide. This absorbs oil near its source and prevents it from spreading. It should be remembered that, as long as the material is disposed of after it is dark from absorption, there will be no waste. Banking the material wider and deeper usually will cut down the time required by maintenance crews to accomplish this task.

Sprayed Liquids

Where oil or other liquids are sprayed from machines, a layer of absorbent just thick enough so that you cannot see the floor surface, should be placed in the aisles. This layer of about an eighth of an inch in depth will usually suffice for several days or a week. Such a spread should be allowed to remain on the floor until it either becomes dark from saturation or powdery from the pulverizing action of foot and wheel traffic. If saturated, the material should be disposed of and replaced with new material. If pulverized, it should be brushed to the bases of machinery for further absorption and later disposal.

Thus far it has been assumed that the only thing on the floor is a liquid spill. Now, let's consider those floors which have accumulations of grease and oil. If the accumulation is a film or layer not over an eighth of an inch thick, the application of a layer of absorbent of the same thickness will, under average wheel and foot traffic conditions, yield a dry floor in several days. If the accumulation is thicker but soft, it may be scraped with metal scrapers. It is not necessary to scrape away all vestiges of grease or oil; rather, scrape the bulk of the accumulation and put down a layer of absorbent to remove the remaining bits of oil and grease.

Hardened Accumulations

For hardened accumulations, two general methods are available. The first method is to emulsify the accumulation with some standard solvent and then immediately afterwards cover the emulsion with absorbent to reduce the fire hazard. This method has the disadvantage of using solvents that may be flammable; or, if a material like lye is used, there is danger it may damage other materials. In any case, a small area should be worked at a time for better control. Another difficulty is that frequently the hardened accumulations are difficult to emulsify.

A second method is to spread at least an eighth of an inch layer of absorbent, leaving it down until it is pulverized. On brushing off the absorbent, it will be found that the upper layer of the caked accumulation will flake off easily. This is because the absorbent takes out the liquid oil present even in seemingly hard, dry accumulations, and which acts as a binding agent. A second application of absorbent should be made and the above process repeated. Although this may be slower than applying solvent or direct scraping, it eliminates the fire hazards of the solvent method and the hard work and time involved in scraping.

The methods described above work well on all types of floor surfaces—tile, concrete, wood, or asphalt. On wooden block floors, the same methods apply, but it is recommended that pulverized absorbent be removed promptly from traffic aisles and used again at the bases of machinery.

Collected Pools

For wooden block floors where oil pools have gradually seeped through and collected below the blocks, a sump method is frequently effective. Wooden blocks are removed from the floor in an area about 24 inches wide and 24 inches long. The cavity is filled with absorbent and covered with a fitted wooden lid so that workers may safely work over the cavity. The absorbent will draw and absorb oil from the area in which it is deposited, and should be removed after becoming dark from saturation. The process should be repeated until the length of time required to saturate the absorbent indicates the area is free of oil.

In many plants particular processing methods involve the occasional spilling or seeping onto the floor of liquid materials that, upon drying,

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form a very hard adhesive coating on the floor. In this category are paints, waxes, tars, and other gummy materials. It is very difficult to remove such materials after they have been allowed to harden; however, if a thin coat of absorbent is spread on the floors in areas where spills are likely to occur, the liquids are trapped and absorbed in a semi-liquid state, keeping the floor surface below dry. This prevents the building up of lumpy, uneven floor surfaces, as well as greatly reducing fire hazards in the area.

With the development of oil absorbents, relatively few plants in industry today have elected to continue to use sawdust for oil absorbent purposes. There are a number of reasons for this. Foremost, of course, is the flammability and source of flash fires that is present in sawdust. In addition, labor costs are too high to permit frequent replacing of oil-soaked sawdust to minimize these fire hazards. Strict control must also be maintained on the disposal routine of oily sawdust because of the continuing fire hazards. Then too, the low absorbing capacity of sawdust invariably results in oily pools beneath sawdust piles. A final deficiency is that sawdust, in most cases, tends to transfer oil that it has picked up to almost any surface coming in contact with it. Thus, personnel working over sawdust often have oil-soaked shoes. Most plants have found they actually can reduce their monthly costs by using an approved oil absorbent rather than sawdust.

Typical Cases

A branch of a large foundry and forging company does a great deal of grinding requiring considerable quantities of oil. Both wooden block sections and concrete floors are used around machines. Oil had been allowed to flow unchecked into wooden block surfaces, presenting a dangerous source of falls and floor buckling. Several concrete aisleways were continually caking with oil and grease which dripped from materials being moved from one machine to another or was carried to aisles from the machinery. Sawdust was being used on a hit or miss basis around some machines, and scraping aisles was done by dragging a very heavy steel tub upside down through the aisles.

Workers were at first skeptical about the efficiency and practicality of oil absorbents. Today, the moderate use of absorbents around machines and in the aisles has practically eliminated slipping and fire hazards, and caked aisles are a thing of the past. Best of all, the routine established with maintenance personnel has served to stimulate interest and effort on the part of employees and supervisors alike in achieving all-around better plant housekeeping and safety.

A printing company had complaints from the company located on the floor below because of oil from presses seeping through the floor and dripping on the next floor. Oil absorbents have not only absorbed the seeping oils, but have gradually dried out the oily floors.

A manufacturer of lock washers had floors caked with machinery oil and the too soft absorbent being used. The manufacturer felt that the slugs punched from the centers of washers, which were embedded all over the floors, were a nuisance he had to accept. The introduction of an all purpose absorbent eliminated the caking, cut down floor maintenance costs, and enables maintenance men to achieve a completely free floor surface everytime they sweep.

A large printing ink manufacturer has found oil absorbents invaluable in reducing fire hazards and slipping dangers in a section handling many flammable liquids.

This brief list of cases could be extended at great length for a variety of industrial concerns using safe absorbents. The basic notions, however, remain fairly well fixed—where liquids on floors present a hazard or a housekeeping problem, the chances are excellent that high-quality absorbents will yield a simple, easy answer.

Pictures by courtesy of Oil-Dri Corporation of America.

National Safety Congress

THE BIGGEST safety show on earth, the annual National Safety Congress and Exposition, will be held in Chicago, Oct. 18–22. More than 12,000 persons from all over the world will hear 600 program participants at 200 sessions discuss the latest advances in accident prevention.

Safety personnel in all fields—industrial, traffic, farm, school and home—will find new information and techniques to assist them in saving lives. In the industrial field alone, 25 complete programs conducted by the industrial sections of the National Safety Council will include automotive and aircraft manufacture, metals, printing, petroleum, mining, food, construction, public utilities, wood products, etc.

In addition, the American Society of Safety Engineers will sponsor sessions of general industrial interest, including safe handling of materials, industrial noise, accident costs, nuclear developments, civil defense, industrial solvents, better seeing and effective communications for improved safety.

Among the prominent representatives of business and government speaking at the Congress sessions will be Crawford H. Greenewalt, president of E. I. du Pont de Nemours & Co., and Secretary of Labor James P. Mitchell.

Edward McFaul, nationally prominent speaker, will give a series of four "early morning" sessions designed to aid the safety man in handling personnel. He will discuss new techniques in handling plant personnel relations, principles of good mental health, and the roles of insecurity, loneliness, illness and old age as accident causes.

The 1954 exposition with its 238 display booths will be the largest and most comprehensive exhibit of accident prevention equipment to be seen anywhere. All exhibit space in the Conrad Hilton hotel will be filled with products, equipment and services relating to the promotion of safety, health, first aid, sanitation and general welfare.

With rough-surfaced coated hand protectors, safety and production go

Hand in Glove

THE SAFE HANDLING of oily sheets of sharp-edged metal is a problem which has plagued metal fabricators since the infancy of the metal-working industry.

New Holland Machine Company, New Holland, Pa., manufacturers of grassland farm machinery, solved the problem by changing to gloves featuring a plastic coating over a cloth akin to turkish toweling.

In seeking a new type of glove to handle oily steel sheets and plates, the company took the following factors into account:

1. The gloves should be as comfortable as possible; that is, they should be flexible and should allow for circulation of air to keep hands cool.

2. They should have a somewhat uneven surface to allow a firmer grip than a smooth-surfaced glove would provide and they should not soak up oil.

3. They should be resistant to abrasion and to cuts by sharp-edged materials.

4. They should give low cost hand protection in terms of long glove life.

Firm Grip

Safety and plant operation men found that the plastic-coated, twisted-loop-pile gloves scored high in every requirement. They proved to be comfortable because the loop pile fabric back permits circulation of cooling air and because they do not tend to wrinkle. Flexibility approaches that of leather palm gloves.

They do not soak up and glaze over with a slippery film of oil or grease when handling lubricated metal. The loop pile construction of the basic fabric results in numerous, small "bumps" on the plastic coating, assuring a firm, safe grip on slippery materials.

The plastic coating is highly resistant to abrasion and to the cutting action of sharp metal, amply protecting wrists, palms and fingers and extending glove life. The plastic-coated gloves are used regularly for extra-heavy duty work in the plant of New Holland Machine Com-

pany, while leather palm gloves and uncoated loop-pile fabric gloves are used for lighter-duty work.

An exhaustive investigation of hand protection methods is called for in any complete safety program. National Safety Council figures show that, despite the growth of mechanized handling, hand injuries still account for about one-third of all reported accidents. Since many minor injuries are not classified as lost-time accidents, and therefore are not reported, the percentage probably is much higher.

Even minor cuts and bruises can be costly. One study, made in 1951, revealed that the average first-aid case involving hand or arm injury cost $2.44. Infected injuries averaged $39.94. It is evident that any effort to reduce these injuries, whether through the use of better gloves or by other methods, will be amply repaid.

The close study given to work gloves is an example of the thoroughness of the intensified safety program adopted by the New Holland farm machinery company in the middle of 1952. This careful attention to detail has paid off, for in the last half of 1952, the lost time accidents per million man hours were cut in half as compared to 1951. The accident rate for 1953 was one third that of 1952.

As the New Holland Machine Company discovered, safety goes hand-in-glove with production when workers' hands are safe in gloves.

Pictures by courtesy of Jomac, Inc.

Spray-Painting School

Two instructors in the DeVilbiss Company school of spray painting estimate they have effected economies of millions of dollars for users of spray painting equipment during their teaching careers. The spray painting course begins in the classroom where the spray gun is thoroughly explained. The theory sessions extend to the other equipment which a spray operator will use. Air pressures, material viscosities, film thicknesses and all of the ramifications of painting are discussed. The pupils also are taught to assemble and disassemble equipment.

After the classroom work, the group is taken into the laboratory where everyone is given an opportunity to prepare materials and spray them. Each student is taught the use of the gun. The classroom theory is put into actual practice so that students can see for themselves the results which correct techniques produce.

Enrollment in the school is free, the only cost to the student being his board and room. Enrollment applications may be obtained from the DeVilbiss Company, 300 Phillips Avenue, Toledo 1, Ohio.

The dates for courses of instruction for the remainder of 1954 are: September 13, October 11, November 8, December 6.

AEC Information Centers

Selection of the Stanford Research Institute, Menlo Park, California, as an Atomic Energy Industrial Information Depository to serve the West Coast area, has been announced by the Atomic Energy Commission. Stanford Research is the third such depository named by the AEC. Others are the Atomic Industrial Forum, New York, and the John Crerar Library, Chicago, Illinois.

Each of the libraries designated as an AEC Industrial Depository receives as an initial complement of material some 700 reports of industrial interest selected from 9,500 "basic science" reports, drawings for the "Swimming Pool" reactor, Nuclear Science Abstracts and bibliographies of selected AEC reports of interest to industry. New AEC unclassified reports of special interest to industry and additional engineering drawings are supplied as they become available. In return, organizations designated as AEC depositories agree to allow general access to the AEC reports collection, to provide adequate reference service to the reports, and to provide photocopies or other suitable single copies to requestors in accordance with established prices for such services.

Short Course in Materials Handling

Co-sponsors of the Packaging and Materials Handling Short Course, the Society of Industrial Packaging and Materials Handling Engineers and the University of Illinois, have released the 1954 Educational Program. The Short Course will be presented in Chicago, September 27–30, as part of the 3-feature event that will highlight activities scheduled for the annual National Meeting of the Society of Industrial Packaging and Materials Handling Engineers. Beginning one day earlier than the 9th National Industrial Packaging and Materials Handling Exposition, the Short Course will be staged at the Congress Hotel, Chicago.

Intensive Review

It is an intensive review of current packaging and materials handling developments and trends. Attendance is open to anyone interested in packaging and materials handling work. Registration can be made on a daily fee basis or on a full course basis. The program is divided into three sections: Packaging Fundamentals, Materials Handling Fundamentals, and Special Management. The fundamentals courses were developed particularly for the person who is new to the field of packaging or materials handling or whose responsibilities in his company may be divided between packaging or materials handling and other work.

Management Course

The special management course is for the experienced packaging or materials handling person who is interested in broadening his knowledge of current trends at an advanced level.

Full details about the Short Course and the Exposition can be obtained from the Society of Industrial Packaging & Materials Handling Engineers, 111 W. Jackson Blvd., Chicago, Ill.

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FOR YOU **it means more savings because it takes less cleanser to clean smooth, soft skin and it gives maximum protection against dermatitis.**

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Edited by
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Master Superior Court, New Jersey
Member
American Bar Ass'n, New Jersey Bar Ass'n,
National Federation Insurance Council
Past Commander, American Legion, Post 10,
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• • •

Accidental Shooting Compensable

A SURVEYOR was one of a crew surveying large tracts of land for atomic energy projects in the mountains of Idaho. The employees took their lunches to the project and the employer furnished drinking water. It was usual and customary for the crew members to carry firearms for shooting rabbits or for target practice. The foreman, too, indulged in this custom. One day the men engaged in target practice during lunch hour; then prepared to go on with their work.

About 15 minutes later, one of the men dropped his gun from his holster. A bullet discharged and ricocheted, striking the surveyor in the left thigh and penetrating his groin. Although the surveyor was rushed to a hospital his leg could not be saved.

At the first hearing, compensation was denied but on review by a higher court, an award was made.

COLSON vs. STEELE, Supreme Court of Idaho, January 10, 1953.

Unusual Exertion Causes Heart Attack

A CLOTHING SALESMAN claimed compensation for a heart condition, called a myocardial infarction. His work often required him to move clothes; but, about 4 times a year, seasonal changes made necessary a more substantial shifting of stock. On one such occasion the salesman was directed to shift several hundred heavy overcoats from their position on racks in the store to racks in a storeroom 25 to 50 feet away.

Previously this kind of work was done by two salesmen, but this time this salesman had to do it alone. "The work had to be done," and he worked steadily and rapidly until he suffered a heart attack.

After several hearings it was held that this attack was produced by accident, and compensation was awarded on the grounds that doing the job of two men required excessive effort and strain of the salesman.

MARGOLIES vs. CRAWFORD CLOTHES, Superior Court of N.J., Appellate Division, February 27, 1953, 24 N.J. Super. 598, 95 A. 2d 413.

Employee's Cold Wet Feet—Compensable

IT WAS NECESSARY for an ice plant employee to be in and out of a cold room where the temperature had to be kept at 25 degrees; and, less frequently, in and out of a locker room where the temperature was much colder.

The floors of the cold room gave the worker damp and wet feet. He claimed compensation because his feet were affected by an arteriosclerotic peripheral vascular disease.

When he appeared before the compensation board, there was no proof that this condition was or could be caused by the occupation. But the board found the work aggravated the underlying condition and considered the aggravation to be an occupational disease. The worker was awarded compensation for total disability.

GRIFFIN vs. GRIFFIN & WEBSTER, INC., Supreme Court of New York, Appellate Division, December 22, 1953.

Soft-Ball Injury—Compensable

A FACTORY WORKER was severely injured when hit by a hard drive while playing in a soft-ball game conducted by an athletic association of employees, on the premises of the employer. The employer supported the team financially, controlled it, was benefited by it, and could at any time stop its operation either temporarily or permanently.

The worker was treated and filed for compensation. At the end of the hearing, the worker was awarded compensation and the employer appealed the award.

In the higher court, it was held that since the employer received the benefit of having such a team and that the employer had such strict control of the activities of the players, the accident arose out of the course of the employment.

TEDESCO vs. GENERAL ELECTRIC COMPANY, INC., Court of Appeals of New York, July 14, 1953.

Personal Errand for Supervisor—Compensable

THE GENERAL manager of a packing plant asked the master mechanic to make a barbecue pit for the manager's personal use and the master mechanic agreed to have the pit constructed at the plant out of discarded metal. The master mechanic was under the direction and supervision of the manager and the claimant worker was under the direction and supervision of both.

The master mechanic told the worker to drive home and get a piece of metal to be used as a grill bar. The claimant worker went to his home, got the metal, put it in the car and started back to the plant.

Enroute to the plant, the worker was seriously injured in an automobile accident. He was awarded compensation on the grounds that he received orders from his employer during working hours; and, on the grounds that an employee should not be required to choose between losing the protection of compensation or losing his job.

WILSON & Company vs. CURRY, Supreme Court of Alabama, November 12, 1953.

any person employed in avoiding an accident.

This does not mean that safety education and training are not most essential aides to accident prevention and should not be given. On the contrary, they are necessary, for the chance of repetition of dangerous practices is greatly reduced and Heinrich's law is spread over a longer period of time.

It is well known that many operators look upon guards with disfavor for various reasons, but, provided the guards are suitable for the purpose, correctly designed and fitted in relation to the parts, this animosity should not arise.

—

Eliminate the Hazard

The intrinsic danger of the 25 groups of dangerous machinery must be removed either at the design stage, by safer construction, or before use, by secure guarding. Notable examples are found in the all-enclosed gear boxes of numerous machines, which have ousted the older train of exposed gears. Modern machines show practically no revolving parts except the arbor spindles, chucks, etc.

It follows that all dangerous risks must be eliminated and the fourth principle of safeguarding can be written as: The Principle of Elimination: ***Dangerous parts of machinery inevitably produce accidents so that, if all accidents are to be prevented, the danger of the said parts must be eliminated either by construction or by secure guarding.***

An important corollary is that to place dangerous parts in such a position that they are presumed to be safe does not eliminate their inherent danger. Furthermore, unless it can be clearly demonstrated that access to, or contact with them, is absolutely impossible, they should be securely guarded. In other words, absolute safety is the criterion by which guarding action is to be determined.

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that certain parts of machinery produce accidents, it is no longer defensible practice to put a person to work on a machine having such parts unguarded. Such a procedure is now quite unnecessary, inexcusable, and illegal.

This fundamental knowledge should now be realized by all managements and leads to the fifth principle of safeguarding: The Principle of No-Risk and Non-Use: ***With certain parts of machinery known to be dangerous, it is essential that no person should be exposed to the risk of injury at a machine possessing such parts when the dangers have not been eliminated. If the machine is dangerous in any respect, it must not be used until rendered safe either by reconstruction or by secure guarding.***

The plea is sometimes made that on account of necessary and urgent production a machine must be placed in operation immediately and that the management must take the risk of an accident.

The operator, however, is the one who is exposed to the risk. At the expense of a temporary loss of production, the only defensible action is to provide suitable guards before the dangerous machine is used.

Misuse of Guards

Obviously, since an injury-producing accident is caused by convergence of two factors, material and personal, absolute immunity from accidents can be achieved only by eliminating the possibility of failure of either.

Even though dangerous parts of machinery are securely guarded so that no contact can be made with them, there is always the possibility of the misuse or disuse of the guards by the person. This includes every person from the management which supplies the guards to the operators who should use them.

For absolute safety, a sixth principle can be stated: The Principle of Training in Safety Precautions: ***Since accidents will enevitably happen should unsafe acts be repeated by the personal factor, it is essential, in addition to eliminating the dangerous parts of machinery, that all persons should be properly and constantly trained in the knowledge and application of safe practice so as to reduce the repetition of unsafe acts.***

The observance of this principle will tend to diminish the number of accidents caused by interference with good guards or by hazardous operations of unskilled or other persons should something go wrong.

Unless all employees are healthy and uninjured, the production efficiency is bound to deteriorate and may, for a particular machine, fall to zero should an accident occur where the operator is incapacitated for a period of time. Substitutes cannot readily be found in a short labor market and, moreover, the psychological effect of an accident upon fellow workers slows up production in the department and sometimes even in the entire plant. This fact is proved by the well known 4 to 1 cost loss ratio factor. It is evident that a seventh principle can be expressed, which is: The Principle of Production Safety Efficiency: ***The overall production efficiency of machinery depends upon the separate efficiencies of each factor involved.***

It is therefore, essential, for obtaining the highest possible overall efficiency, that not only should each machine be maintained at the maximum working efficiency but that all dangerous parts should be securely guarded and all operatives fully trained in safe practices.

This principle is self-evident, but instances continually arise of unguarded or insufficiently guarded machines being operated by persons who have never been instructed in even the elementary aspects of safety.

(To be continued in the October issue.)

From an address presented at the National Safety Congress.

Pictures by courtesy of: left, General Electric Co.; top, General Motors Corp.; right, Carnegie-Steel Corp.

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Why Your Safety Means So Much
in Big Plants
& Small
Let's put it this way: Assume that an average workman has a wife and two children and during a year's time each member of the family has an accident, such as a bad fall, cut, burned fingers or any injury that would prevent normal activity for a day or so. This might not seem too bad. But suppose in a plant of 10,000 workmen, each employee has a lost time accident. That would mean 10,000 injuries in one year! WOW!
Small plants SEEM to have so few accidents that many of them do not even figure their rate. If they did, the chances are they would get a big surprise, for the accident rate of small plants may be higher than for big plants. It doesn't matter what size plant we have—safety requires the cooperation of everyone for his own good.
Play it safe wherever you are.
John Doe

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...talks the worker's language!

Full of color, pictures, humor and snap, it makes safety interesting and down-to-earth. 12 times a year it covers every accident hazard. Nationwide, leading industrial firms state it's the *only safety paper their employees will read* . . . and take home to their families.

It gives you the advantages of personal contact, saving time and money. When it prevents one Lost Time accident, it has more than paid its cost for the year. Try it . . . it works!

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NOTE:

Your Safety News is designed to promote better employer-employee relations. Every item is carefully weighed from this viewpoint.

INSIDE PAGES
(pages 2 and 3)

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Electrical Wiring Advisory Service

WITHIN ITS OWN ORGANIZATION, Consolidated Edison of New York has set up an Adequate Wiring Bureau, staffed with competent personnel, and offering free a completely non-competitive advisory service in connection with present and potential electrical wiring problems. Inquiries come from owners, finance companies, architects, consulting engineers, management companies, builders and contractors, all of whom have a vital interest in existing and future electrical capacity issues. In its few months of operation the bureau has made recommendations in the design of wiring systems to be installed in some 50 new structures, and has been involved in the rewiring of at least 200 existing buildings.

The improvement to be gained in presently inadequate electrical systems varies, of course, with conditions. The size of existing conduit and the wire already in it has considerable bearing on the rate of increased capacity to be obtained. However, with the code permitting 50% conduit fill occupancy on rewiring—as against 40% for new wiring—the bureau recommends loading present raceways to capacity and replacing old rubber covered wires with new ones having modern, thinner insulation, which occupy less space than rubber insulated wire of the same capacity. This is a practical, economical method of improvement. Usually it provides double—sometimes triple—the present electrical service in a building.

For systems so over-loaded that the above plan falls short of meeting emergencies, the bureau suggests—in addition to rewiring the raceways—that lower floors be cut off from the present systems, new conduit run in to service these floors, and changes made in basements appropriate to a split system. The dual advantage here is that it is less costly than a complete rewiring job, and fewer tenants are inconvenienced during the rewiring operation.

Long range planning is important and cannot be ignored, for unless every possible provision is introduced into wiring systems of new construction to meet anticipated increased usage of electrical appliances, modern high geared electronic business machines, and modern industrial methods, the electrical capacities in new buildings can be exhausted within the next 15 to 20 years.

The bureau strongly urges contractors, engineers and owners to prepare for this electrical expansion in all new construction. It recommends, for example, running in extra steel raceways during construction and using at least a size larger conduit than risers require. This adds but little to original installation costs and puts buildings in a better situation to acquire greater capacity when and if it is required later on. With systems thus liberally designed, wires can be pulled into the already installed, unused conduit, and/or added to the larger capacity raceways at very nominal costs.

"SAFETY MAINTENANCE" Salutes a Safety Idea

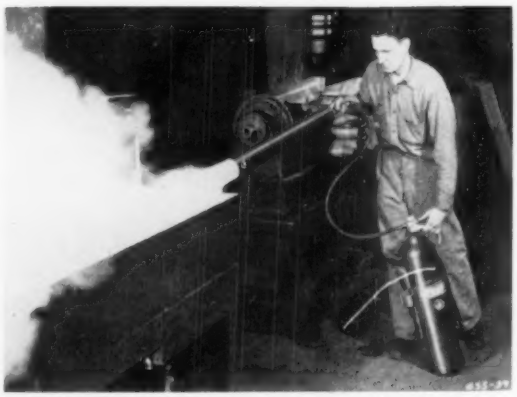
Enlightened Light-Man Lightens Load

TIRED OF LOOKING like a man carrying a "bundle of sticks" during his maintenance chores, this lighting maintenance man at the Westinghouse Transformer Division, Sharon, Pa., decided to sweep out the old method. Result is this light aluminum ladder rigged with a holding rack for luminaire and burnt-out lamp plus a set of laminated plastic quivers for individual replacement lamps.

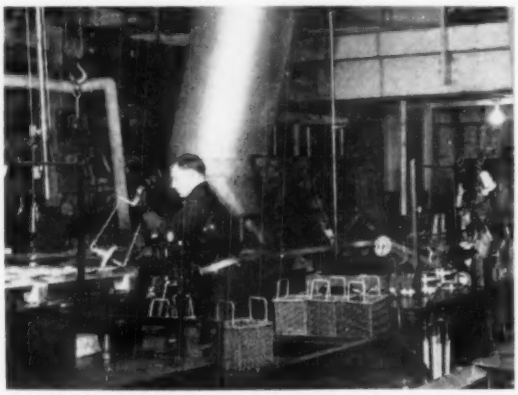
Picture by courtesy of Westinghouse Electric Corporation.

SOLVENTS: THEIR DANGERS.

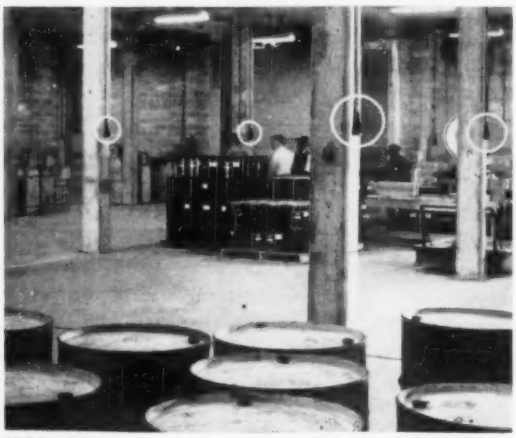
By H. W. SPEICHER, Industrial Hygienist
Westinghouse Electric Corp.



FIRE PROTECTION—Standby hand extinguisher knocks out small blaze in rinsing bin. Some solvents are fire hazards.



HANDLING—Employees need protection from fumes and skin contact with many solvents by ventilation and clothing.



STORAGE—Requires adequate ventilation and fire protection. Note CO_2 extinguisher nozzles of automatic system.

SOLVENTS AND SOLVENT mixtures have been widely applied, both in industry and in the home. Many solvents represent a potential hazard from the point of view of flammability, health or both.

In selecting a solvent for a certain purpose, one of the first problems is to choose one that will satisfactorily perform the function intended for it. Usually, solvents are used for dissolving some substance or acting as a diluent for another solvent. Solvency power is not, however, the only quality to be considered. A number of other characteristics, such as toxicity, potential skin irritation, degree of flammability, flash point, evaporation rate, ventilation requirements, economical value, etc., enter into the selection problem.

Even though these factors must be stressed when selecting a solvent, practically any solvent can be used with safety under suitable conditions. However, the precautions required for safety vary greatly with the manner and location of usage. It is one thing to control the conditions of use in a large plant with adequate facilities, but it may be another problem in a small establishment, in which only a few people work and where economic conditions may not seem to justify the necessary facilities for safe use of highly toxic or flammable materials.

By one solvent classification, solvents are either flammable or nonflammable. The Interstate Commerce Commission regulations define flammable solvents with flashpoints below 80°F as belonging to group A flammable materials. Group B includes those solvents with flashpoints between 80°F and 110°F and group C solvents with flashpoints above 110°F.

. . . and HOW TO CONTROL THEM

All so-called flammable solvents will produce a flame over the surface of the liquid when heated to a certain temperature, if a small flame is held near the surface. The temperature of the solvent at which the solvent vapors will ignite is known as the flash point of the solvent and is the lowest temperature at which enough vapor is evaporated from the surface of the liquid to produce a flammable mixture with air.

A flammable liquid itself does not burn; but the vapors above the liquid, produced by evaporation, are flammable. The vapors are produced more rapidly as the temperature of the liquid increases so it may be assumed that any solvent reaching a temperature above its flash point is producing sufficient vapors to cause a flammable mixture with air. Therefore, any solvent above its flash point may produce a fire, if a source of ignition such as a flame, static or electrical spark is present. After a fire is once started, the heat generated speeds the evaporation of the solvent tremendously; and the fire grows rapidly in intensity. Solvents with low flash points become ignited much more easily than those with high flash points and, therefore, require more careful handling.

Below Flash-Point Dangers

Even though the temperature of a solvent is below its flash point, it can ignite if only a small portion comes in contact with a high temperature source such as a flame or welding arc. This small portion of the solvent is heated above its flash point and enough vapors are produced to form a flammable mixture with air. More solvent is evaporated to create a greater volume of a flammable vapor-air mixture and the fire spreads rapidly. Many fires, costing millions of dollars, such as the recent General Motors fire, have occurred in just this way.

Flammable solvent "mist-air" mixtures may also be produced by solvent-spraying operations. These mixtures may be easily ignited, especially if the liquid mist is from a low flash-point solvent and the mist particles are very small.

Sometimes a flammable solvent may ignite without a spark or flame, if a sufficiently high temperature source such as a piece of hot metal, hot oven or hot wire is present. This type of ignition is known as an auto-ignition of the solvent vapors. Flammable solvents have variable auto-ignition temperatures as well as variable flash points.

Solvent Vapor Behavior

Explosions are the result of rapidly generated pressures from flammable solvent vapors burning instantaneously, and the containing walls of the flammable vapors bursting outward. However, flammable solvent vapors usually burn rather quietly in an open container where the combustible vapors are free to expand.

Most solvent vapors are heavier than air and have a tendency to become more concentrated at the bottom of a container or on the floor of a room because of gravitation, but they do not settle rapidly since air diffusion is always present. For this reason, the intake for a ventilation system of a flammable solvent storage room or any other location in which flammable solvents are used should be within a foot of the floor of the room, rather than near the ceiling. Flammable solvent vapors may spread over a large floor area, if not properly ventilated and be ignited by an arc or motor in operation at a considerable distance.

The concentration of a flammable vapor must reach a certain value before it can become explosive in air. This minimum concentration is known as the lower explosive limit and is the percent of solvent vapors necessary in air to support a combustion if an ignition source is present. For practical purposes flammable solvent vapors should not exceed 25 percent of the lower explosive limit, unless an approved flammable vapor alarm is in proper operation. Even then the flammable vapor concentration may only be allowed to reach 50 percent of the lower explosive limit, as in the case of ovens. The lower explosive limit for many flammable solvents is approximately 1 percent by volume in air. Only the range of vapor concentrations between the lower and upper explosive limits is explosive, and, theoretically, the vapor concentration could be kept above the upper limit. However, it is usually only practical to stay well below the lower limit, rather than try to maintain vapor concentration above the upper limit.

Toxic Solvents

Any material that produces an unfavorable reaction with any kind of animal or plant tissue is a toxic substance, and the degree of toxicity varies widely with different materials. Depending on the kind of solvent, it may cause skin irritation, low blood count, reaction of the nervous system, irritation of the respiratory

(Continued on next page)

tract, or affect one of the vital organs. Solvents may enter the human body by absorption through the skin. Materials such as tetraethyl lead, commonly used in gasoline, anilin or anilin dyes, phenol, cresol, etc. do so, when they come in contact with the skin for an appreciable time. They may also be ingested, but this method of entry is unusual. Vapors or mists from toxic solvents are the more frequent problem and enter the respiratory system and blood by being present in the inhaled atmosphere.

Some solvent vapors can be breathed with safety but the vapor concentration should not exceed a certain maximum allowable concentration (M.A.C.) for an 8-hour period, but a somewhat higher concentration may be breathed for a short period of time. These maximum allowable concentrations are usually expressed in parts per million (PPM) or milligrams of material per cubic meter of air. Various toxic materials have different maximum allowable concentrations. For example, the maximum allowable concentration for carbon tetrachloride is only 25 parts per million. That means that only 25 volumes of carbon tetrachloride vapor are permissible in a million volumes of air. This low vapor concentration indicates that carbon tetrachloride is a very highly toxic solvent and may be present in toxic concentrations when its characteristic odor for detection is absent, since the odor of its vapors cannot be detected by the average person if the concentration is much less than 100 parts per million.

Maximum allowable concentrations for a large number of solvents and other toxic materials have been determined by various toxicological laboratories and from industrial experience. A list of these maximum safe breathing limits is published by the Governmental Industrial Hygienists once a year in one of the issues of A.M.A. Archives of Industrial Hygiene and Occupational Medicine. The maximum allowable limits for some solvents vary somewhat from year to year as more information about their toxicity is available.

Solvent Types

Many of the common industrial solvents may be classed as either petroleum (aliphatic), aromatic (coal tar) or chlorinated solvents, as well as acetates, alcohols, etc. Examples of petroleum solvents are kerosene, gasoline, petroleum naphthas and stoddard solvents. All of these materials have various degrees of flammability and are explosive when the percent of solvent exceeds about one percent by volume in air. Gasoline and low-flash naphtha are usually so highly flammable that it is well to exclude their use as cleaning agents, if possible. So called "stoddard" solvents with flash points above 100° F. are preferable for several reasons if their solvency power is satisfactory. Stoddard sol-

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LONG WEAR
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OILACE COVERALL All neoprene, net lined short boot with adjustable knee strap and black neoprene non-skid design outsole. Also available, a Neoprene 12" Snugfit Boot and a regular Neoprene Short Boot.
WORKIN 6" all rubber work shoe with the appearance of a leather shoe, DURATEST non-skid design outsole, cushion insole. Steeltoe or plain.
BAR-FLEX SHORT All black industrial boot with white Bar-Flex outsole, the patented outside arch and heel for more comfort and traction. Also available, the regular Industrial Boot in all heights, and a popular price Utility Boot.
TOP NOTCH
INDUSTRIAL
BEACON FALLS CONN
DURATEST SOLE
BEACON FALLS RUBBER FOOTWEAR
Beacon Falls Connecticut
(For details, use Key # W-15 on card on page 75)

vents are usually cheap and are frequently satisfactory for such purposes as grease and dirt removal, but may dry slowly.

These solvents are usually desirable and satisfactory for motor cleaning for example, since the fire hazard is only moderate, the degree of breathing toxicity is low, and their solvency power is not detrimental to insulation unless it is of a silicone nature. Portable motors can be cleaned very safely in a tank not exceeding 150 gallons or having less than 10 square feet of open area, provided the hinged cover of the tank has a fused link and would close immediately if the solvent should catch fire. Several approved fire extinguishers should be mounted nearby. The tank should have a sump pump and hose for washing the dirty disassembled parts with a stream of the solvent.

The maximum allowable vapor concentration for continuous breathing of petroleum solvents usually ranges between 500 to 1000 parts per million. Some of the common toxic characteristics resulting from overexposure to petroleum solvent vapors are defatting and irritation of the exposed skin after prolonged or repeated contact, headaches and narcotic effects if large quantities of the vapors are breathed.

Aromatic Solvents

Some of the commonly used aromatic solvents are benzene, toluene, and xylene because of their greater solvency power. These solvents are sometimes known commercially as benzol, toluol and xylol. Their vapors are much more toxic than petroleum solvent vapors and their degreasing action on the skin is more rapid, causing irritation to develop much faster and more severely. Persons that breathe excess quantities of aromatic solvent vapors for a prolonged period of time usually experience blood changes, such as a reduction of the number of red cells and tendencies towards anemia. Headaches or anesthesia usually occur first, but even death may occur from acute vapor exposures.

Because of the higher toxicity of aromatic solvents, the maximum allowable concentration for continuous breathing during an 8-hour period is not more than 200 parts per million for toluene and xylene and not more than 35 parts per million for benzene. Due to the much greater toxicity of benzene, its use should be limited as much as possible or eliminated entirely. Less toxic toluene or xylene should be substituted where an aromatic solvent is necessary. If petroleum solvents are satisfactory for the operation, it is desirable to use these less toxic solvents. Frequently, the petroleum solvents are less expensive and do not require as much ventilation as the more toxic aromatic solvents. Petroleum solvents are not as harmful to protective clothing such as gloves and aprons either. The flammability of aromatic solvents is high. The lower explosive limit is

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approximately 1 percent of the vapors in air by volume and the flash points of these solvents usually belong to Group A.

Chlorinated Solvents

Chlorinated solvents usually have high solvency power and frequently compare favorably with the aromatic solvents in this respect. Industrially, some of the more commonly used solvents are carbon tetrachloride, trichlorethylene, perchlorethylene, methylene chloride and methyl chloroform.

These solvents may produce an anesthetic effect or nausea and may cause organic changes, mainly in the visceral organs, such as the liver and kidneys. Their action on the skin is similar to that of the aromatic solvents. The maximum allowable concentrations for these solvent vapors vary from 25 parts per million for carbon tetrachloride to 500 parts per million for methylene chloride and methyl chloroform, and 200 parts per million for trichlorethylene and perchlorethylene.

Because of the very high toxicity of carbon tetrachloride, it is being rapidly replaced by the less toxic chlorinated solvents that usually are equally effective for most industrial applications.

Trichlorethylene and perchlorethylene are commonly used in vapor degreasers and methyl chloroform for small bench cleaning operations. Incidentally, methyl chloroform can be safely used for cleaning all metals except aluminum. If properly stabilized against its corrosive action on aluminum the solvent may also be used on this metal.

New Solvents on Market

During the last few years a large number of commercial solvent mixtures of chlorinated and petroleum solvents have come on the market. One reason for this increase seems to be the search for a less toxic substitute for highly toxic carbon tetrachloride. Some claims for these mixtures are that they have a low toxicity or are even non-toxic. The fact that they contain one of several chlorinated solvents other than carbon tetrachloride, however, gives them a definite degree of toxicity depending upon the percentage and kind of chlorinated solvent used in the mixture. The percent of chlorinated solvent seems to vary from 25 to 50 percent in most brands.

The chlorinated solvent fraction is frequently more volatile than the petroleum solvent fraction and, therefore, such solvent mixtures are not stable with usage. The original solvent mixture, although relatively non-flammable, may be sufficiently flammable after a period of usage to create a definite fire hazard which otherwise did not exist. Because of the difference in evaporation rate between the chlorinated solvent fraction and the petroleum fraction of such mixtures, a greater health hazard may exist than is apparent if equal evaporation rates of both con-

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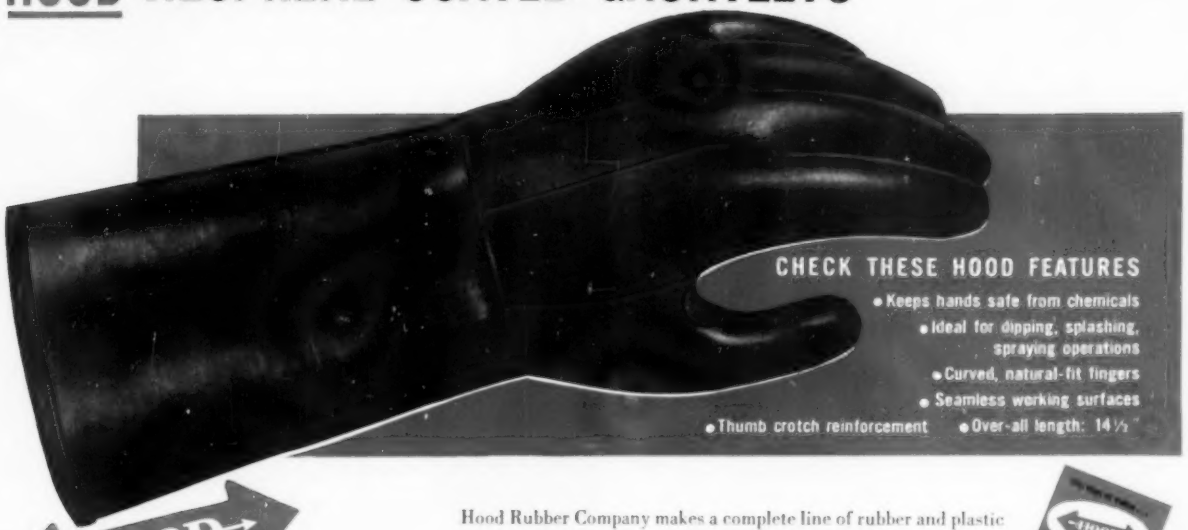
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stituents are assumed. Frequently, local exhaust ventilation is required for their use, just as for the higher toxic chlorinated solvents.

When comparing straight petroleum or chlorinated solvents with petroleum-chlorinated solvent mixtures, a comparison should be made on the basis of requirements for the job, fire hazard before and after usage, rate of evaporation, cost per gallon, requirements for safe usage during the life of the solvent, guaranteed consistency of the petroleum-chlorinated mixture, toxicity of breathed vapors and potential skin irritation if there is prolonged contact without protection.

Alcohols and Acetates

The alcohols are usually highly flammable and have a low order of toxicity, with the exception of methyl alcohol which is very toxic, and vapor concentration should not exceed 200 parts per million. Optic nerve damage is of greatest concern; and, in extreme cases, blindness may be the ultimate result.

Acetates are frequently used as solvents for cellulose acetate coatings such as lacquers. These solvents are highly flammable. They may irritate the mucous membrane, particularly the eyes and respiratory tract and are mildly narcotic. These solvent vapors are usually pleasant to most people but occasionally some persons are nauseated from breathing the vapors. The maximum allowable concentration varies from 200 to 400 parts per million and these solvents are, therefore, less toxic than the aromatic and most chlorinated solvents.

Carbon disulfide is a highly toxic solvent that may affect the nervous system and the maximum allowable concentration is only 20 parts per million. It has one of the widest explosive ranges of any solvent. It is explosive from one to fifty percent by volume of its vapor in air.

Hot alkali solutions usually only emit steam that should be ventilated so a worker can clearly see his operations. Dry alkaline chemicals should be added to water slowly with sufficient stirring to cause immediate solution. It is most desirable to add these chemicals when a solution is relatively cool or before the solution is heated at the beginning of a work period. A serious eruption of the solution may occur if the dry chemicals are added too rapidly and a solution is too warm. The temperature of a solution should be less than 50° C.

Care should be taken to prevent skin contact and breathing of vapors or mists from solutions containing phenols or cresols which are part of many compounded solvents for removal of carbon deposits from metals.

Storage and Handling

All solvents should be received in containers that are not easily broken, such as metal. These containers should be labeled with the name of the material and a brief statement of necessary precautions regarding

(Continued on page 48)

SAWDUST, SPANGLES,

—BELOW

Performer checks safety wires, too, as "roughneck" adjusts tension on the rigging for former's act. Performer will feel safe and be safe!

BEHIND THE GAY carnival atmosphere of the "Big Top" is the somber responsibility of achieving the highest level of safety in spite of the natural and assumed hazards of The Greatest Show On Earth.

Spectacular feats of trapeze and high wire artists constitute but one of the safety problems. Others include unloading Ringling Brothers and Barnum and Bailey's 5,850 ***tons*** of equipment and rigging it in all kinds of weather conditions; keeping visitors safe from the animals (and sometimes vice versa); and protecting crowds against panic.

According to Robert Reynolds, veteran head of properties, the circus' safety

LEFT—High trapeze artist examines new safety ending of wire rope which supports her act at the top of the tent.

RIGHT — Aerial juggler tests tension of wire rope on which he performs feats. He prefers a slack wire; and, oh yes, also a safe one!

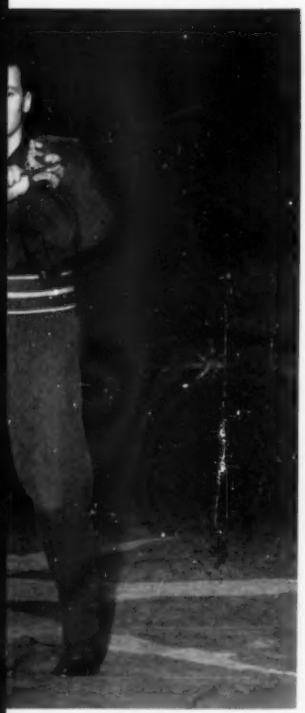
and SAFETY

LEFT—
High above the heads of the audience trapeze performer waves gaily—safer than gasping crowd knows, because of care, training and safety devices.

record is fantastically good. Accidents are few. The entire company is always on the lookout for new safety devices and methods.

Most recent innovation in safety equipment is the replacement of supporting fiber rigging for trapezes with ⅜ inch improved plow-steel wire rope slings with safety endings. Trapezes are used by a chorus of 60 beautiful girls (sixty—count 'em—sixty) in a swing trapeze ballet right under the Big Top. The new wire rope slings replace hand spliced hangers. The ends of the ropes are double-locked for additional strength, with the wire ends

(Continued on page 63)



ABOVE—Property superintendent with heavy safety responsibility of circus, checks guy wire before performance begins.

RIGHT — Midget and equestrian watch as property assistant tightens one of thousands of wires and ropes which hold up Big Top!

Vision Workshop

"SHIRT-SLEEVES" IDEAS of industrial executives and the ivory-tower concepts of professional people will be blended in a unique way as they study ways to build production, cut accidents and bolster employee take-home pay at the Sixth Occupational Vision Workshop at Georgia Tech in Atlanta on November 18.

Participants will include representatives of management, workers, industrial optometry, industrial ophthalmology, industrial nursing, architecture, safety, industrial and illuminating engineering.

Highlighting the session will be the recognition of 6 Southern industrial concerns whose vision programs have been designated by the Southern Occupational Vision Council as outstanding in at least one way. Top executives will relate how their firms did it. Each profession will thumbnail its interest in vision and outline its service as background for the presentation.

Elements of a good vision program include systematic screening of employees' eyesight, eye-safety plans, a good lighting installation, a good paint job using proper colors, and proper administration.

Col. Lambdin Kay, Atlanta, Associated Industries of Georgia, is president of the sponsoring Southern Occupational Vision Council. N. F. Stambaugh, architect, is vice-president and R. E. Eskew, Georgia Tech, is secretary-treasurer.

P. W. Logan, Atlanta, president of the Georgia chapter, American Society of Safety Engineers, and Dr. William N. Cox, Georgia Institute of Technology, represent the safety field on the workshop's planning committee.

Carbon Brushes for Electrical Machines

JUST PUBLISHED BY THE CARBON SECTION of National Electrical Manufacturers Association is a monograph titled "Carbon Brushes for Electrical Machines, Their History, Properties and Application." The monograph stresses the application of carbon brushes, the types of carbon brush materials, properties and operating characteristics, the selection of brush grades, the problems of commutation and the care of brushes and suggestions for eliminating trouble. Copies are available from NEMA Headquarters, 155 East 44th St., New York 17, N. Y., at $1.00 per copy.

LIFTING

Lifting an object, no matter how light—
Can get you in trouble, if not done just right.
These few simple rules, and plain common sense—
Will aid in preventing, most accidents.

Always remember, the back must be straight—
And the knees should be bent, so the legs bear the weight.
Raise the load steadily, don't jerk or pull—
If it's over the limit, get help or a tool.

It's a sure way of getting, a sprain as a gift.
Look out for splinters, burrs or snags—
While handling boxes, barrels or bags.

And when it comes to reaching, there's just this to say—
If you have to stretch, then it's too far away.
Prepare for the job, before you start—
Don't go taking chances, that's playing it smart.

The preceding rules, if used as a guide—
If faithfully practiced, and daily applied,
Will give the protection, you need to get by—
So don't you think, that it's worth a try?

by "Red" Mascari
J. T. Baker Chemical Company

Keep-It-Clean Team

TWO MEN HAVE been appointed "housekeepers" for Georgia's largest industrial family in a single location, the Lockheed-Marietta aircraft factory.

They are Don S. Gee, newly-named conservation engineer, and Reynard N. (Ray) Jones, who is the new housekeeping coordinator.

Gee is the over-all chief of the good housekeeping program and Jones' job is to see that the plant, inside and out, is as neat as a Dutch doorstep. As housekeeping coordinator, he walks more than 10 miles daily, grading housekeeping in some 70 acres of inside manufacturing areas. He has many acres more of outside areas to also watch over.

Two secrets of success are cited by Jones and Gee:

(1) They don't try to do the housekeeping. Each of the more than 14,000 Lockheed workers is a housekeeper and each is responsible for keeping his or her area clean and tidy.

(2) They go all-out to prevent litter from being made. They are alert for "litter bugs" and correct bad housekeeping before it gets out of hand.

Conservation engineer Gee attended Ohio State University where he specialized in industrial management. Formerly with McDonnell Aircraft company, St. Louis, Mo., and the Curtiss-Wright company, Columbus, Ohio, he came to Lockheed-Georgia in 1951.

Housekeeper Jones came to the Marietta factory in 1951 as a spares control supervisor. He was formerly with Vega Aircraft company in California.

Aim of the two-man "keep-it-clean" team is to bring to the Georgia factory the title for the best housekeeping in the aircraft manufacturing industry. Housekeeper Jones says, "Good business and good housekeeping are the same thing." He might have added that good housekeeping is practically synonymous with good safety practices.

Industrial Hygiene

Associate Editor
Jacob A. Goldberg, A.M., Ph.D.

Carbon Tetrachloride Poisoning

A DISCUSSION OF THE HISTORY of carbon tetrachloride poisoning, by B. L. Hardin, Jr., M.D., is now available in limited quantities in reprint form. Published originally under the title "Carbon Tetrachloride Poisoning" in the Industrial Medicine and Surgery Magazine of Chicago, the article deals with the pathology, physiology, dangerous uses, chemistry, treatment and general history of carbon tetrachloride.

Treatment for any form of carbon tetrachloride poisoning consists of nothing specific, according to Dr. Hardin, for there is no drug that checks carbon tetrachloride or alleviates the damage done to the kidney or liver. Treatment is generally helping nature to tide the patient over until the regenerative power of the affected cells builds them back to normal again.

The doctor also discusses the symptoms of various degrees of carbon tetrachloride poisoning. He includes an extensive bibliography, which should be a help to industrial physicians and nurses faced with this problem. Reprints are available from the John B. Moore Corporation, 349 Franklin Avenue, Nutley 10, New Jersey. Single copies may be obtained without charge; additional copies can be secured for 25 cents a copy.

Noise and Production

THE PROBLEM OF NOISE AND HEARING DAMAGE IN industrial plants has been brought to an annoying degree of perplexity because of the many unknown factors that have yet to be evaluated properly. Mr. John V. Grimaldi, of the Association of Casualty and Surety Companies covers three phases of the subject in a recent article. They are the effects of noise in damaging hearing, in affecting human behavior, and in interfering with communication.

Analysis of the first shows that hearing may also be impaired by aging and illness, that impairment caused by noise may be temporary, and that the effects of noise on hearing acuity must be analyzed with respect to both intensity and frequency. Other variables include the possibility of faulty procedures of testing either the environment or the hearing loss of an individual, variations of environmental noise, and individual susceptibility to hearing loss. It is believed, therefore, that even though it is not difficult to measure deafness, it is exceedingly difficult to separate the origin of the deafness and, without equivocation, charge industry with being solely responsible for it.

Noise and Safety

Although it is believed highly probable that noise has some psychological influence on man, much of the experimentation is said to be poorly controlled and the results questionable. In general, studies that have been conducted with reasonable care indicate that psychomotor activities are not significantly affected by steady or expected noises, but that discontinuous noises are more disturbing. Some people have more tolerance than others for noise.

The effects of noise on safety, speed and accuracy of performance cannot be indicated conclusively without further research; however, noise that interferes with a worker's ability to hear warning signals or recognize changes in normal sounds of machine operation is known to be a hazard to both machine and operator. For the present, there have been no expressions of

recommended noise limits for the maintenance of safe performance environments, nor is there any evidence that consideration is being given the possibility of this factor. The most important phase of the noise problem is reported to be interference with communication because it may cause interruption of production, delays, and other general inefficiencies and increased costs. It is believed that speech-interference levels, as measured in decibels, may have the same limits as those for hearing damage and psychomotor effects. If so, the criteria for its control might be set "positively" in terms of what is needed for optimum production. Mr. Grimaldi concludes that reported losses of hearing and production efficiency cannot be accepted without solid foundation of facts, analysis, and, if possible, tests.

Book Outlines Medical Progress

IN THE PAST 75 YEARS MEDICAL SCIENTISTS HAVE learned more about the nature, treatment and prevention of disease than in the previous 3,000 years. This point is stressed throughout "*Seventy-Five Years of Medical Progress, 1878–1953*," a unique symposium published by Lea and Febiger, and edited by Dr. Louis H. Bauer, F. A. C. P., secretary-general of The World Medical Association and past president of the American Medical Association.

Contributors include a score of clinicians and investigators, representing every major specialty of medicine, as well as general practice. Each writer tells of three-quarters of a century of progress in his own field. As a result, light is thrown on a remarkable medical era from many angles.

The idea for the book sprang from the First Western Hemisphere Conference of The World Medical Association, held last year in Richmond, Va. Papers contributed to this conference, presenting synopses of the history of each medical specialty, correlated with authoritative clinical summaries of advanced practice, are now gathered in this volume.

Education Pays

THE STATEMENT "Public health is purchasable" is readily recognized as having been originated by a former health commissioner of New York City and State. In his original pronouncement, the late Dr. Herman Biggs emphasized that within reasonable limits a community's health record can be determined by whether it provides adequate or inadequate funds for its public health program. The national decline in the death rate and the accompanying increase in longevity are recognized results not only of increased scientific information, but also the increase in public appropriations to prevent or control disease of various kinds.

A large insurance company has recently published a report on its findings covering the years 1919 to date. The death rate per 100,000 insured industrial policyholders in 1911, from all causes, was the high of 1253.0. By 1952 this figure had declined to 652.4, or a decline of 47.19 percent. Even more significant has been the decline of 92.9 percent in puerperal diseases; 94 percent in tuberculosis; 99.9 percent in typhoid fever; 99.2 percent in communicable disease of childhood (measles, scarlet fever, whooping cough, diphtheria) 90.0 percent in diarrhea and enteritis; 99.1 percent in diphtheria; 88.6 percent in appendicitis; 26.1 percent in motor vehicle accidents; 53.7 percent in home accidents; 77.7 percent in pneumonia; 76.9 percent in syphilis; and 50.0 percent in occupational accidents of civilians.

Some of the educational programs started later than 1911, the one dealing with occupational accidents being in effect only since 1942. It is evident from these rather striking figures that public health is truly purchasable. So is industrial health when activated by effective and well trained industrial nurses and safety engineers. The task of education is a continuing one in industry as it is in every other sphere. Repetition time and again, in various ways, using all available means, is essential if results are to be achieved.

Some Industrial Hygiene Facts

A LEADER IN THE FIELD of industrial hygiene has summarized some of its basic concepts noting that industrial hygiene is concerned primarily with prevention. That is to say, it is the duty of the industrial hygienist to determine the causes of, the extent and the control of industrial illnesses, not to diagnose and treat them.

The industrial hygienist may be able to define the causes of industrial illnesses better than the medical practitioner, and the person held responsible for prevention must find the cause if he is to put his preventive measures into effect. His most convenient criterion of working conditions is the nearness of the workers' environment to the ideal. The quality of the environment is measured by admittedly arbitrary specifications which are, however, set by various committees of qualified personnel. About 1940 the American Standards Association formed a committee to formulate "allowable concentrations" of such impurities as carbon monoxide, lead dust, and various solvent vapors. A few years later, governmental industrial hygenists started their less formal series on "threshold limit-values," which are now revised and published annually. They serve as a practical guide to control certain working conditions and are being used in many countries.

In industry the difficult problem is the instilling of a sensible routine to prevent chronic and cumulative occupational disease. Respect for acute poisons like carbon monoxide is much easier to teach and to achieve than respect for repeated exposure to substances such as benzol vapor. Once management and labor are convinced that a bad condition must be remedied, progress can be made and effective results achieved.

By MARK M. LUCKENS
Consultant in Industrial Hygiene & Toxicology, New York

PERCHLORETHYLENE

Compound: Perchlorethylene
Synonyms: Tetrachlorocthylene, tetrachlorethylene, Perchloroethylene, Carbon dichloride, Carbon bichloride
Formula: Cl_2:CCl_2

Physicial Data:
Appearance: Clear colorless liquid
Odor: Faint, ethereal: offensive to some people
Boiling Point: 121.2°C
Melting Point: —22.5°C
Vapor Pressure: 23 mm Hg. (25°C)
Density: 1.61 (25°C)
Vapor Density: (air=1) 5.7
Refractive Index: 1.50547 (20°C)
Flammability: Not flammable at ordinary temperatures; decomposes and burns at high temperatures.
Solubility in water: 1 ml/10,000 ml (20°C)
Solubility in organic solvents: Miscible with alcohol, ether, benzene, chloroform, and other organic solvents.
Percent in saturated air at 25°C: 2.6
Density of saturated air: (air=1) 1.1 (25°C). 23 ml of perchlorethylene when volatilized and evenly distributed in 1000 cubic feet will result in a concentration of 200 parts per million in the area.

Industrial Uses: Solvent, degreasing, dry cleaning

Medical Uses: Anthelmintic

Maximum Allowable Concentration: American Conference of Governmental Industrial Hygienists: 200 parts per million of air.

Toxic Action: This compound is considered relatively non-toxic; it should not, however, be regarded as harmless. Perchlorethylene is 2.8 times as powerful a narcotic as carbon tetrachloride. Like other halogenated hydrocarbons, it should be considered a metabolic poison affecting the liver and kidneys particularly. No authenticated deaths have been reported from industry, though fatalities have been reported from other sources.

Symptoms of Exposure:
A. Inhalation: Stupor, dizziness, nausea, vomiting, narcosis.
B. Oral Ingestion: Gastrointestinal pain, nausea, vomiting, diarrhea, bloody stools
C. Skin: Dermatitis, blistering

Laboratory Diagnosis: No objective tests are available.

Detection and Analysis:
1. Silica gel method as described by Pernell, C. in the Journal of Industrial Hygiene & Toxicology, Volume 28, page 237 et seq (1946).
2. The R & H Tri Per Analyzer is designed to estimate the concentration of Perchlorethylene in air photoelectrically. It is described by V. F. Hanson in Industrial and Engineering Chemistry, Analytical edition, volume 13, page 119 et seq (1941).

Storage and Handling: Perchlorethylene is a relatively non-toxic, non-flammable liquid. It should, however, be stored and handled with care. It should be kept in a well ventilated room, away from heat and open flames. Containers should be sealed and properly marked. Employees should be warned that excessive or repeated inhalation may result in discomfort and perhaps injury, and that repeated wetting of the skin with this material may cause a dermatitis. Care should be taken to avoid accumulations of the vapors of this material, especially in enclosed spaces.

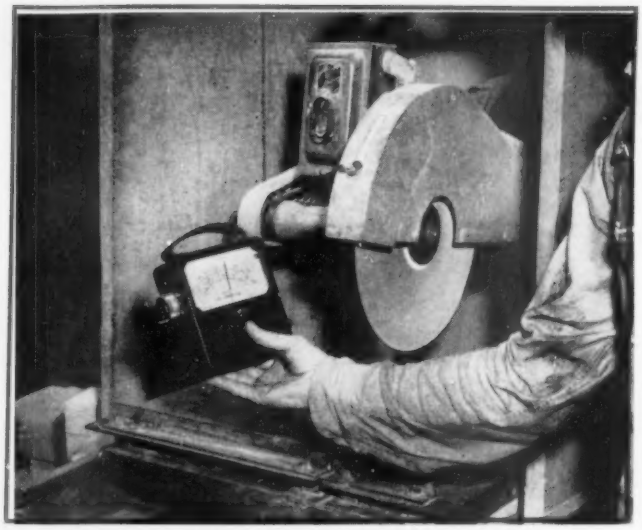
Preventive or Remedial Measures:
1. Employee training in proper handling procedures.
2. Proper exhaust ventilation for operations involving the use of this compound.
3. Provision of protective clothing and respirators where indicated.

By W. G. HAZARD
Industrial Hygiene Director
Owens-Illinois Glass Company
Toledo, Ohio

CHECKING DUST CONTROL SYSTEMS

THE INDUSTRIAL HYGIENIST determines when an exhaust system is needed to control a plant air-contaminant. Actual design, maintenance and repair of the system fall in the lap of the plant maintenance or engineering department. In plants where there is an industrial hygienist, the safety engineer generally has little to do with exhaust systems. However, in plants where there is no industrial hygienist, the safety engineer can play a role of great benefit. He can make certain checks without going into details of design.

1. Air samples: Exhaust systems that are meant to control a health hazard succeed or fail according to how well they keep the air contamination in the workroom below dangerous levels. Usually this can be determined only by air samples and analyses that actually measure the amount of the harmful agent in the air. This determination is the job of the industrial hygienist. The method used varies according to whether the material is silica dust, or other toxic dust; vapor, as from



CHECKING—velocity of air entering hood with anemometer.

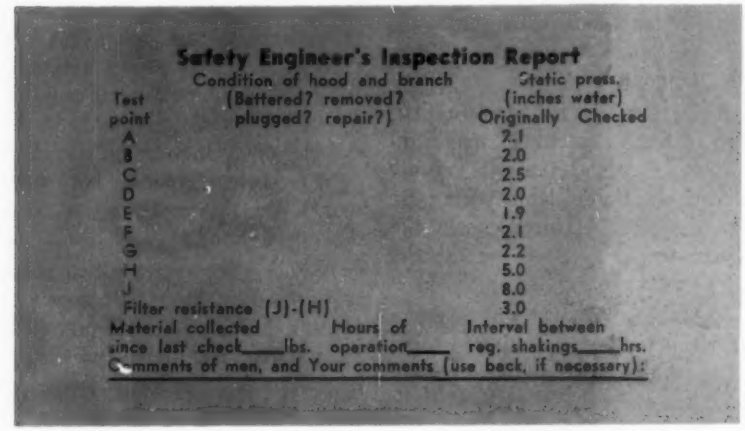
CHECKING—direction of air movement near toxic weighing.

CHECKING—suction in hood throat with water manometer.

a solvent or degreaser; fume, as from welding; gas; or even hot air—for the latter can be classed as a contaminant, and exhausted to the outdoors.

When the plant has no full-time industrial hygienist, as most plants do not, the safety engineer should arrange for these tests. They are his responsibility rather than that of the plant engineering department.

Such tests are not needed when the contaminant is not harmful, as with wood dust, lime, coal, and other nontoxic materials.



Safety Engineer's Inspection Report

Test point	Condition of hood and branch (Battered? removed? plugged? repair?)	Static press. (inches water) Originally	Checked
A		2.1	
B		2.0	
C		2.5	
D		2.0	
E		1.9	
F		2.1	
G		2.2	
H		5.0	
J		8.0	
Filter resistance (J)-(H)		3.0	

Material collected since last check____lbs. Hours of operation____ Interval between reg. shakings____hrs.
Comments of men, and Your comments (use back, if necessary):

2. Plan: For existing exhaust systems the safety engineer should get a simple sketch of the layout. This need not be a working blueprint, or even to scale. A simple line drawing may be sufficient. All that needs to be shown is the order in which branches come off the main ducts, diameters of all ducts, arrangement of fan and collector, size of fan and motor, and if possible, overall rate of air flow and static pressure as specified by the designer of the system.

3. Test holes: In each branch, near the hoods, at the collector intake, and at the fan intake, the safety engineer should have simple test holes drilled, about 1/16 inches in diameter. These should be numbered serially with paint or tags, and on his sketch of the piping he should mark the approximate location of each hole, with its number.

4. Portable U-tube: He should then equip himself with a U-tube or water manometer. After connecting one leg of the manometer to a piece of rubber tubing, he can hold the other end of the tubing over each test hole in order and measure the static pressure or suction.

If the system is new, he should see that the plant engineering department "balances" the air flow from each branch—which means that the correct amount of air flow, as called for by the designer, is passing through each branch. If the contaminant is a health hazard, air samples, taken after balancing the system, will tell the safety engineer whether control of the air pollution has actually been established. From then on, assuming no changes are made in the hoods, piping or process, he can be assured that the equipment is continuing to work right, if rechecks at the test holes give him the same static pressure readings as the initial ones.

Rechecks with the U-tube should be made regularly, probably at intervals of not over a month. He should have a mimeographed form to record permanently the current readings, so they can be compared with the initial readings. These suction rechecks make it unnecessary to take frequent air samples.

Certain other defects, which can be checked merely by looking should be noted: bent or battered hoods, new branches that may have been added, changes in the process, etc.

5. Meaning of U-tube readings: Since the safety engineer knows what the static pressures were when the system was properly balanced, changes from these values will show if and where trouble develops.

For example: The increased reading in the first branch, with other readings remaining normal, shows something is plugging that branch between the test hole and hood.

A decreased reading in the branch would mean there is an obstruction farther up the branch, that is, between the test hole and the main duct or header.

A partly plugged arrester would result in a decreased reading upstream and an increased reading downstream.

Decreased fan capacity due to slipping fan belt, dirty or worn blades, disjointed pipe between fan and arrester, or an open cleanout door would give the decreased suction readings throughout the system.

Thus relative changes in readings at different test holes can be used to track down the trouble.

Certain absolute values are important too. For example, although suction at a hood is no guarantee that the hood will control the contaminant, some state codes do require that a certain minimum negative pressure be present, often 2" water gauge. The safety engineer should have a copy of codes applying to exhaust systems (usually ad-

ministered by the state labor department). He should see that their suction requirements are met.

6. Repair orders: When maintenance work is needed, the safety engineer should see that the proper work orders are processed, following his plant's usual procedure for this.

Some may think monthly inspections of exhaust system performance, including measuring the static pressure, are more the responsibility of the plant engineer than of the safety engineer. Experience has shown, however, that unless the safety man takes this equipment under his wing, it will often be neglected. This happens for two reasons: first, most local exhaust systems are not production equipment; if they were they would be assured of regular care. Second, while they are a collection of sheet metal, fans, motors and other mechanical devices, which are engineering in nature, their basic purpose is to improve the comfort or safeguard the health of the people on the job. This aspect is definitely the worry of the safety man, and only indirectly of the plant engineer.

The fact is, a system can be mechanically OK, in that the piping is tight and well supported, the fan properly chosen, the bearings well greased, the motor not overloaded, etc., and yet the system is a failure. It's a failure because it does not succeed in making safe the air which the men breathe. This is the "proof of the pudding"—and the safety engineer (or industrial hygienist) is in the best position, through his air samples and other tests, to see that the equipment does really clean up the workroom air.

Common Errors

There are of course, certain inspections that the plant engineer should make, just as he would with any other moving machinery. On regular schedule he must lubricate the fan and motors, check rapping mechanism of the filter, inspect the latter for leaky bags, check any motor-driven dampers, etc.—and repair them, when necessary.

Production people and even engineers have misconceptions sometimes, for which safety engineers should be on guard. Here are a few:

1. Performance Guarantee: Since the safety engineer is concerned with unsafe work conditions, he should do all he can to see that the purchasing department, when placing an order for a local exhaust system, has a performance guarantee written into the contract.

2. Adding Hoods: Many a first-class exhaust system is made ineffective by the hit-or-miss adding of new hoods in later years. Be sure the plant engineer checks the system to see if it will handle the extra load.

3. Makeup Air: Getting makeup air, tempered in winter, into a room is sometimes a more preplexing problem than the exhaust system itself. Be sure this problem is solved beforehand.

4. Explain to Employees: The man on the job must understand the reasons for the exhaust system, and how to operate it, if it is to give him full protection. The safety engineer can assist the supervisor in giving this explanation. Better yet, consult the men before the final design is agreed on—so there will be the least amount of interference with their work from hoods, enclosures, etc.

5. Smoke Tubes: One of the handiest gadgets the safety engineer can have is a smoke tube (available commercially) to show the path of air currents as they enter the hoods. With it he can often convince the operator of the importance of baffles, closeness of hood to dust source, etc.

6. Fallacy of Heavy Vapor: Because some vapors like benzol, trichlorethylene, carbon tetrachloride, and the like are heavier than air, many people think downdraft ventilation or hoods at floor level are a must. The fallacy is that vapors coming from a process do not persist for long in an undiluted state. They are soon mixed with air, by random wind and convection currents. Once mixed, they don't normally settle out to form a heavy, concentrated layer at the floor.

A concentration of 1000 ppm of benzene is 25 times the maximum allowable limit, by health standards. It is far more concentrated than would be permitted in any workroom. Yet, this mixture is only 0.17 per cent heavier than air, even though pure benzene vapor is three times heavier than air. Thus the ratio of weight of air to weight of the benzene-air mixture is only 100 to 100.17. There could never be any sinking or stratifying of this 1000 ppm mixture. A side or back hood would be just as effective as a downdraft hood.

7. Fallacy of "Sucking" the Contaminant Into Hood: Because people can feel air blowing out of an air line some feet away from the end of the pipe, they think that dust-laden air can be sucked into an exhaust hood from several feet away. This is not true. Air can be sucked only one-thirtieth of the distance it can be blown. In exhausting, the air velocity has fallen to 10 percent at a distance of only one pipe diameter out from the end of the pipe; in blowing, this 10 percent figure is reached some 30 diameters out from the end of the pipe. Suppose for example, we have a six-inch pipe sucking air in so the pipe velocity is 4000 feet per minute. Only six inches out from the "sucking" end of the pipe the velocity will be a mere 400 feet per minute—hardly enough to feel. But at the blowing end, this 400 fpm velocity will not be reached until you go 30 diameters, or 15 feet away from the pipe end.

This misunderstanding also crops up when installing propeller fans in walls or windows to provide ventilation. Such fans are incapable of withdrawing air directly from any operation in the center of the room, or in fact, from any area more than a foot or two from the fan. Beyond that they act only by diluting the room air by drawing in masses of makeup air through doors and windows.

From an address presented at the 41st National Safety Congress.

Pictures by courtesy of Owens-Illinois Glass Co.

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Solvents

(Continued from page 37)

flammability, toxicity of vapors, or possible unfavorable reaction with the skin. When solvents are taken from a large container and placed in small containers the name of the material as well as warning labels should be put on the small containers.

Solvents should be stored in an approved storage space or building that is cool, ventilated, and constructed from non-combustible material. Usually, only one drum of a flammable solvent should be permitted at any shop location, unless an approved storage space in each location is provided. All flammable solvents should be kept in safety cans equipped with flash arrestor screens. The cans themselves should be approved by Underwriter's Laboratories.

Barrels containing flammable solvents should be provided with safety bungs and safety spigots. These safety bungs and safety spigots should have an Underwriter's approval to be certain they will not transmit a flame and permit an explosion of the vapors within the barrel. If barrels are in a vertical position, the contents should not be forced out of the barrel by pressurizing the barrel above the liquid with compressed air. An Underwriter's Laboratories approved pump should be used for dispensing liquid from barrels in a vertical position. Whether the barrel is in the horizontal or the vertical position, it should be properly grounded; and a metallic conductor should directly connect the barrel with the container into which the solvent is to be poured. In this way, both have the same electrical potential, eliminating the possibility of a spark being generated during the solvent dispensing operation.

Ventilation

Forced ventilation is usually necessary for proper ventilation of solvent storage areas and provision must be made for air to enter the room as rapidly as the forced ventilation system is attempting to remove it. Gravity type ventilation usually is very ineffective.

Explosion proof switches, lighting fixtures, motors, etc., should be provided, so there is no possible source of ignition. When dispensing solvents from drums, in the horizontal position, drip pans should be provided directly under the drum spigot in order to prevent spillage. Non-flammable absorbents should be used to absorb small amounts of spillage.

Sufficient general ventilation should always be provided to prevent the solvent vapors from exceeding the maximum allowable concentration for safe breathing. It is usually preferable to provide local exhaust ventilation at the point where the solvent vapors are generated. In this way the toxic and flammable vapors are collected before they have a chance to diffuse into large quantities of air, which then need to be removed from the area. It may also be possible to use the solvent in a complete enclosure.

Other Protections

Occasionally, it becomes preferable economically to supply persons with respiratory equipment where only very short exposures may be encountered or ventilation would not be practical. Self-contained breathing equipment, air line respirators, or hose masks should be provided workers if there is a possibility of oxygen deficiency, as may exist in tanks that formerly contained solvents as in the case of storage tanks or degreasers. Respirators are designed to give adequate protection for certain purposes. Dust or fume respirators usually are not adequate for solvent vapors or vice versa. Solvent vapor respirators require treated charcoal cartridges for absorption of the vapors, respiratory equipment that is self contained, or equipment that has a hose attachment to supply only safe air from an uncontaminated source. All respiratory equipment and replacement parts should be Bureau of Mines approved and can be recognized by the approval label.

Protective clothing prevents solvents from coming in contact with the skin or a worker's regular clothing and later producing severe skin irritation or being absorbed through the skin in toxic concentrations. Protective clothing, such as aprons and gloves, must be made from material that will not deteriorate over prolonged periods of contact with the solvent or acquire a static charge during usage. Static charges on the surface of clothing can be a serious ignition hazard for flammable solvent vapors.

Hand creams are usually of little value for protection against the solvents with the higher solvency powers, such as chlorinated and aromatic solvents, but some give reasonable protection against mild aqueous solutions and petroleum solvents.

Where flammable solvent vapors are being used, adequate fire extinguishing equipment should be on hand. This equipment should be automatic whenever practical. Chlorobromomethane, which is less toxic and possibly more effective than carbon tetrachloride, should be used if a vaporizing liquid extinguisher is desired. The dry chemical, CO_2, etc. types of fire extinguishers are preferable and usually more effective for solvent fires than the halogenated solvent type, and there is less of a health hazard.

Adequate eye protection should be provided when persons are working with solvents. If, however, a splash in the eye should occur, the victim should know, from instruction, that he should immediately flush his eyes with running water for 10 or 15 minutes and then report to the first aid station or medical department for further evaluation of potential damage. Eyewash fountains of the bubbler type which can supply water at body temperature and operate by a foot pedal may be desirable.

Solvents should not be used for removing dirt or grease from the hands or other portions of the skin. Non-irritating, powdered hand soaps or waterless hand creams are commercially available.

From an address delivered at the annual Greater New York Safety Convention.

Pictures by courtesy of: top, Randolph Laboratories, Inc.; middle, The Timken Roller Bearing Co.; bottom, Walter Kidde & Co.

The

Industrial Nurse

Editor
Rosamond J. Webster
R.N., A.M., Ph.D.

Hard Work

A LEADING BRITISH PHYSICIAN points out that hard work, with its mental and physical activity, does not as a rule cause disease. He holds that the concept that hard work is the cause of disability does not rest on a sound understanding of the physiology of activity, and further, that there is abundant scientific evidence to show that none of the known effects of work can harm healthy tissue. Of course, each of these stands or positions has to be properly interpreted. It should be noted that while holding that hard work does not cause harm, there is the major qualification in the words that such work does not harm ***healthy*** tissue. This must be interpreted, for instance, that a sufferer from a heart or lung disease ***can*** be harmed by hard or strenuous work. On the other hand, healthy individuals can evidently stand considerable strain, the human body being able to make marked physiological adjustments to varied work situations.

Evidently, it is wise for industry to provide preemployment examinations in order that physically suitable workers may be selected for specific jobs. Such occupations as require much muscular exertion should necessarily be performed by workers who are in prime physical condition. Other types of positions or jobs can readily and effectively be filled by those who do not rate as high in physical health, stamina and capacity. It is a matter of competent medical judgment as to which type of worker—assuming comparable training and experience—will do best in specific jobs. But the health of workers changes with the passing of years. The industrial nurse can usually be the "eyes" of the medical department in watching for the early signs of physical impairment.

Changing Emphasis

THE LAST MEETING of the National Tuberculosis Association observed the 50th Anniversary of this well-known voluntary health organization, reminding us that the tuberculosis future has changed materially in this country in the last half century. It may be truly said that in some parts of this country tuberculosis is really under effective control. In many sections of the land, however, tuberculosis still is a major problem in public health. At this recent annual meeting, the Board of Directors of the NTA recognized the need to change the emphasis from tuberculosis alone and include the entire field of pulmonary diseases. This means all diseases of the chest outside of the heart.

The statement prepared on this occasion read in part as follows: "All pulmonary diseases have to be considered by the physician in the differential diagnosis of pulmonary tuberculosis. X-rays of the chest reveal shadows which may be tuberculosis or may be some other type of pulmonary disease. Certain non-infectious pulmonary diseases, such as emphysema and cystic degeneration of the lungs occur as important complications in the treatment of patients with tuberculosis." In addition, as a further index of the broadening concept, the name of the American Review of Tuberculosis has been changed to the American Review of Tuberculosis and Pulmonary Diseases.

These news items are valuable indications of the willingness of leaders in the fields of medicine and public health to recognize social and scientific changes and advances and to act accordingly for the public good. Mass X-ray surveys, for example, have turned up more cases of lung cancer, particularly among the older poulation. That is one undertaking that many industrial nurses are familiar with. Their own readiness to accept changes, scientific progress, and necessary modifications in their day-to-day practices can spell out better service to the workers in industry.

Data on Obesity

PUBLIC HEALTH LEADERS have for a long time warned against the common practice of self-imposed dieting among men and women who deem themselves to be overweight. That sounds simple enough, but when food fads enter the picture, when self-medication, dehydration, and even semi-starvation are practiced, more harm than good can result. Industrial nurses frequently find young women who complain of headaches, various pains, tiredness, and lack of energy. Investigation of their eating habits will often show that instead of a hearty breakfast after a 15 to 16 hour fast, a cup of black coffee and a cigarette is all that these dietees have had for their morning meal. The list of examples can be expanded to other groups as well.

A competent American researcher points out that there are a great many scientific questions relative to obesity or overweight which still have to be solved. One of these relates to height, weight and age tables that are usually taken as standard, and are made to apply equally to the really fat individual and to the one who has heavy muscles and a big bony structure. An athlete

in good training is not as a rule fat but he may be, and frequently is, overweight according to such tables. It is held that any person who is 30 percent or more "overweight" is very likely also to be overfat, but at lesser variations from so-called average weight this is not necessarily the case.

The question of overweight is of distinct importance in view of the rise in the average age of our population, and the relation of overweight to coronary heart disease among adults. If the elimination of obesity can help to reduce this heavy toll among middle aged people of all classifications, every considered effort is worthwhile. But such reduction in weight usually requires competent medical advice. Have your plant physician prescribe for the individual needing such help. Do not take it upon yourself—as an industrial nurse—to make medical decisions.

Labor Health Plans

THE INDUSTRIAL NURSE MUST necessarily ever be on the alert to learn of new plans, practices, laws and scientific advances that in some way may affect her daily duties and responsibilities. For some years labor health plans have been developed by various labor groups, such as the United Mine Workers, the International Garment Workers Union, the Amalgamated Clothing Workers of America and others in many parts of the country. They provide physical examinations, diagnosis, treatment and even hospitalization in some instances.

Generally speaking the plans now in effect can be classified as follows: (1) Those purchased from commercial insurance companies and classed as cash indemnity payments which pay some part of medical and hospital costs. (2) Blue Cross and Blue Shield plans which were instituted largely to cover hospital and surgical expenses. (3) Medical service for ambulatory cases, providing such diagnosis and treatment as is possible in a well equipped medical center, staffed by full-time and part-time physicians. (4) Complete comprehensive medical service provided by a group practice medical center, with home and hospital care.

These plans are not necessarily new, but are the culmination of many separate movements that have been developing for many years, such as the development of industrial medical programs; the growth of medical knowledge and community health facilities; and governmental recognition of occupational accident and disease as an area of public concern. The enactment of Workmen's Compensation throughout the country is adequate evidence. Perhaps many more changes will take place in the practice of medicine, especially in its application to the maintenance of the health of workers in industries. Industrial nurses need wide reading and broad understanding of the latest developments to help them become effective in their day-to-day work. Those interested in further details are invited to write to the editor of this section.

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The Cardiac in Industry

A CONFERENCE WAS HELD a few months ago with several physicians from industry and insurance companies participating, as well as others concerned with the placement of the cardiac in industry. It was pointed out that locating the employee with heart disease is the key to the problem. This may be done in various ways, *especially the careful and periodic examination of workers over 40 years of age.*

In one large industry employing thousands of workers examination of those who had no medical complaints and no readily apparent cardiac disease symptoms, showed 15 percent had evidence of heart disease or conditions potentially capable of producing it. Discovery was followed up by careful examinations made at regular intervals. This is the preventive aspect, and the greatest factor in keeping the worker with heart disease on the job without harm to himself. Under such examination and control measures, the work record of most of the cardiacs was almost perfect from the standpoint of absenteeism and illness. Specific recommendations included the following: (1) The

future of the cardiac patient who escapes from an acute attack depends more upon the amount of original pain, and the freedom of breathing than on the size of the heart or any other findings recorded by instruments. (2) The person who shows symptoms should not be placed in a job where the sudden recurrence of severe discomfort may result in a dangerous incident. (3) Employees who have suffered a recent heart attack should be kept from work that involves heavy lifting, excessive stair climbing or walking, driving and any emergency work in the first 6 to 12 months. (4) The individual whose heart shows a good recovery in the year following an acute attack should not be handicapped by needless physical restrictions, which may only confirm to him the belief that he is totally and permanently disabled.

The Effects of Stress

An editorial in a recent issue of the Journal of the American Medical Association points out that although ideas about stress and stress diseases have not yet been crystallized, the current trend in medicine is to recognize stress as an important contributory cause of disease. There are many kinds of stress, and the ways in which they cause disease are not yet well understood. The problem is a real one, and many authorities would include duodenal ulcer, thyrotoxicoses, malignant hypertension, thromboangiitis obliterans, ulcerative colitis, rheumatoid arthritis, and other disorders in which stress plays an important, if ill-defined role.

Such widely different factors as infection, intoxication, trauma, muscular and nervous fatigue, extreme heat or cold, and irradiation elicit from the body a similar response and have been grouped together as types of stress. Stress is held to imply an inner conflict or a conflict against circumstances for which no immediate action is appropriate. Although there is apparently a great difference in the ability of different persons to withstand what appears to be the same amount of stress without showing signs of breakdown, evidently no one is immune if the stress is severe enough and sufficiently prolonged. This applies particularly to industrial exposures to stress conditions.

As with other conditions, prevention is better than treatment and possible cure. Much study is being carried on to determine how various forms of stress, from personal difficulties in family life, to poor working conditions inherent in some jobs and industries, cause severe end results. During World War II combat stress was carefully studied by teams of scientists, who came up with some interesting results—physiological and psychological as well—bearing on combat stress and fatigue. In industry, marked absenteeism, a high rate of labor turnover, and deficient or low production—may warrant study of stress factors.

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The Fire Front

Fire Prevention Week

PRESIDENT EISENHOWER has called on the Chamber of Commerce of the United States, the National Fire Waste Council and other organizations to renew the fight against fires which last year cost the nation thousands of lives and nearly $1 billion.

Mr. Eisenhower, proclaiming October 3–9 as Fire Prevention Week, said "the effectiveness of sound fire prevention programs has been demonstrated in communities throughout the land."

Included on the program will be community fire prevention education, fire-fighting demonstrations, and inspections of local fire department facilities, industrial plants, commercial buildings, homes and schools.

Most of the activities of Fire Prevention Week will be carried on by the 37 national organizations affiliated with the National Fire Waste Council and the more than 1,300 fire prevention committees of local chambers of commerce.

June Fire Losses Down

ESTIMATED FIRE LOSSES in the United States during June amounted to $65,533,000, the National Board of Fire Underwriters reports. This loss represents a decrease of 3.1 per cent from losses of $67,644,000 reported for June, 1953, and an increase of 5.2 per cent over losses of $62,282,000 for May, 1954.

Losses for the first six months of 1954 now total $455,990,000 an increase of 5.5 per cent over the first six months of 1953, when they amounted to $432,081,000. Estimated insured losses include an allowance for uninsured and unreported losses.

Plant Fire Drill

UNDER THE DIRECTION of George Driscill, Chief of Plant Protection at Worthington Corporation's Harrison (N. J.) Works, the Worthington Fire Department is called out semi-monthly for drilling. Various layouts of hoselines are practiced as well as the use of extinguishers, fog nozzles, ladders and other equipment. Actual oil fires are made once a month utilizing large pans of oil which are extinguished by the Fire Department in demonstrating and testing the equipment for peak efficiency.

Although controlled fires are used in drills, there was actually no fire on the building roof as shown in the photograph. The smoke was produced by the burning enthusiasm of Worthington's retouch artist!

Fire Fighting Symposium

THE BUREAU of Yards and Docks of the Navy Department is sponsoring a Symposium on Fire Fighting to be held at the U. S. Naval Civil Engineering Research and Evaluation Laboratory, Port Hueneme, California, on 16, 17, and 18 November 1954.

The Symposium will be broad in scope. Emphasis is on problems, unique solutions, and requirements for operation in military bases ashore and afloat. Its objective is to explore and discuss these and current and future developments pertaining to the field of fire fighting. Topics such as "Crash Rescue Problems" and "Extinguishment of Large Scale Fires" are to be included.

Representatives of various military services, research centers, professional fire technologists, and manufacturers of related equipment are invited to attend. Requests for further information should be directed to Officer in Charge, Code 794, U. S. Naval Civil Engineering Research and Evaluation Laboratory, Port Hueneme, California.

Ahern Appointed as Government Consultant

JOHN J. AHERN, director of the department of fire protection and safety engineering at Illinois Institute of Technology, Chicago, has been appointed fire protection consultant to the Department of Defense.

Magnetic Separators Reduce Textile Fires

In a report recently issued by the Factory Mutual Engineering Division it was revealed that the three major causes of industrial fires by percent are: electrical, 19%; friction, 14%; foreign substances, 12%.

In commenting on this insurance organization's report, Mr. R. C. Hoff, Director of Engineering and Manufacturing of the Eriez Manufacturing Co., laid particular stress on the percentage of fires caused by foreign substances. He said, "Tramp iron and foreign metal contamination in processing systems have long plagued manufacturers, especially those in cotton textile production. Generally, the opening room fires originate in high speed machinery where fast-moving ferrous particles, imbedded in cotton stock, strike equipment, cause a spark, and send fire through the entire pneumatic system. Consequently, fire is not confined to the opening room, but in a matter of seconds is frequently carried to other buildings, endangering lives as well as property."

A magnetic separating device to reduce this tramp iron hazard is a permanent (non-electric) spiked apron magnet, engineered specifically for the textile industry and designed for suspension over the top of any spiked apron feeders which feed carding machines. A spiked apron installation has inherent advantages in that the efficiency of the magnetic separator is increased many times because it is placed at a point where the material is being conveyed in a slow, even, thin flow.

Mr. Hoff further stated that, "an analysis of the prime causes of industrial fires shows that permanent (non-electric) magnetic equipment eliminates not only the foreign substance hazard which is the third largest cause of fires, but also reduces the first and second largest causes of fire: electrical and friction.

"With electrically powered separating equipment, power supply can be affected by power lags, surges or current interruptions. Fuse boxes and wiring for electrical current is needed, coils can burn out, and rectifier sets are necessary. Also, since this equipment is powered by electricity, electrical fires can easily be started if the equipment is not properly maintained."

Fire and explosion codes emphasize that all sources of ignition must be eliminated both from inside the machinery and the area immediately surrounding the equipment itself. Insurance companies, after experimentation and testing, have approved and recommended permanent (non-electric) magnets when properly installed at strategic points —particularly ahead of grinding and pulverizing mills, and in textile lines conveying combustible fibres. Magnetic units prevent the entry of ferrous materials to the textile processing lines, and thereby preclude any sparks caused by tramp iron striking fast-moving processing machinery.

Fire Specialists

Twenty engineers, who were graduated from various engineering colleges throughout the country have begun a 5 months' training course in fire protection engineering at the National Board of Fire Underwriters in New York. The course, which is being conducted by Edgar P. Slack, professor and chairman of undergraduate physics at Brooklyn Polytechnic Institute will cover all phases of municipal fire protection with senior engineers of the National Board presenting the lectures.

Lewis A. Vincent, NBFU's general manager, said that the on-job training program is designed to fill the need for specialists in fire protection engineering and that after completing the course the men will be assigned to teams of engineers making surveys of the fire-fighting and fire protection facilities of the nation's major cities. The surveys, Mr. Vincent said, are one of the major activities of the National Board and, over the years, 500 cities have been inspected—several of them many times.

The surveys deal with municipal water supply, fire-fighting and alarm facilities, building codes and structural conditions. They are furnished to member companies and to city officials to inform them if and where their protection is weak and how it can best be improved. The activity, conducted without cost to the cities, has been instrumental in bringing about broad improvements in municipal fire protection.

Fire-Safe Schools

The National Board of Fire Underwriters is distributing a new 21-page pamphlet on fire-safe school buildings to educational institutions throughout the country. The publication presents in brief form the essential elements of fire-safe school buildings and makes recommendations for obtaining fire safety in new buildings and in existing ones.

The pamphlet points out that on an average of once every hour during the working day—3,400 times a year—fire breaks out in some school. Over a period of years, 827 deaths have occurred in 60 of the more tragic school fires. Only last spring, the National Board pointed out, fire in an up-state New York school took the lives of 15 children, seriously injured 17 others.

In addition, 11 school fires last year resulted in losses of $250,000 or more per fire. The structures destroyed included elementary schools, high schools and university buildings.

The pamphlet deals with fire-safe building construction, that is, the limited use of combustible material, fire separation between stories, subdivision of large-area buildings by fire-resisting walls, and adequate exit facilities. It points out that fire extinguishers are needed for incipient fires wherever they may occur. Standpipe and hose systems are needed in the taller buildings. Automatic sprinkler systems are the answer where more than a limited amount of combustible material is present in construction or occupancy. They are also helpful in

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overcoming some structural defects and provide excellent control of fire hazards.

Heating and ventilating equipment, electric wiring and appliances, gas piping and appliances, school shops, laboratories, lunch rooms, storage areas, and waste paper handling arrangements all require proper safeguards.

Included with the pamphlet is an inspection blank which suggests that inspections be made monthly by the building custodian and a member of the faculty and quarterly with a member of the fire department. The blank, properly filled out, is to be filed with the board of education or school commissioners.

The National Board holds that many existing school buildings can be improved and made reasonably safe. Others have hazards which could be corrected only with such large cost as to make correction impracticable. When that is found to be the case, the National Board said the use of such buildings should be discontinued immediately. "The building may have been used for many years, but that is no proof that fire may not strike tomorrow with tragic loss of life," it was declared.

The National Board added that school fire safety requires more than a building of fire-resistive construction. It requires, it said, a properly balanced combination of building construction, fire extinguishing facilities, means for guarding against fire hazards, and regular fire exit drills. Above all, it requires the continuing administrative attention to them.

Hot stuff to handle — slip-ups can happen. It's a job for experts, but no place for spectators. Keep unnecessary risks away. Equip your ladle-carrying cranes and other load carriers with a **FEDERAL Model "J" siren.** Like a fire truck or other emergency vehicle, let the siren clear the path before you. The unmistakable sound of the Model "J" siren with its high, contrasting pitch will cut through other noise levels. Eliminate common-place hazards with suitable audible signals. FEDERAL Horns, Sirens and Bells are designed specifically for industrial applications. Write for our Industrial Signal literature or see your Electrical Distributor today!

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Electric Motor Undamaged by Dry Chemical

FOR SOME YEARS, FIRE PROTECTION experts have recognized the ability of dry chemical fire equipment to extinguish electrical fires quickly and economically, but some have hesitated to recommend it because of a belief that the chemical is abrasive and may damage electrical motors or other sensitive equipment.

Recent evidence tends to minimize this possibility. Ansul Chemical Company reports that tests in Winnipeg, Canada, indicate that dry chemical can be used safely on electrical motors, without danger of abrasion.

The tests were conducted by Power and Mine Supply Company Limited, in the presence of many commercial and civic fire prevention leaders. Equipment used in the test was a seven and a half horsepower 550-volt direct-current open-type electric motor and two 4-pound dry chemical fire extinguishers. The motor was put into operation, and, while running, the contents of one 4-pound extinguisher were emptied into it through both end bells. The armature fields, commutator,

brushers, brush-holder and all other parts were thoroughly covered with the dry chemical.

According to the report, the motor continued to operate without any adverse effect whatsoever, as normal ventilation carried off excess dry chemical. The motor was then stopped and the contents of another 4-pound extinguisher were partially discharged into the motor. This time all ventilating slots in the armature were filled, the commutator was completely covered and the brushholder packed with dry chemical. After the motor was again put into operation, it performed just as it did before the tests started.

When the motor finally was stopped, an air hose was used to blow the remaining dry chemical off and out of the motor, including the ventilating slots on the armature, fields, etc. This required about one minute.

When the motor was inspected, it was found the motor would not require dismantling or overhauling, but that relubrication of the bearings would be desirable. No abrasive damage to the commutator was found.

It was also commented that use of an air line hose to blow the chemical out of the ventilating ducts would be sufficient servicing for those electrical motors containing ball bearings. On the other hand, for those motors using sleeve or roller bearings, it was recommended that the bearings be drained, flushed, and re-piled or greased, and that the balance of the equipment be blown off.

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Be Prepared For Winter

WATER IS RECOGNIZED as one of the most effective agents for extinguishing fires in ordinary combustible material. When used as a solid stream or coarse spray, as applied with a fire pail, pump tank or self-propelled extinguisher, water acts quickly to cool the burning material below the point where it will continue to burn.

Regardless of the method used to apply it, the water must be readily available, both in winter and in summer, and in such quantities as to provide adequate first-aid fire protection. It should be protected from freezing if it is exposed to temperatures below 32° F., and guarded against evaporation during hot dry periods.

Calcium chloride is ideally suited to provide this year round protection for fire fighting equipment in which water is the extinguishing agent. The properties of calcium chloride that make it useful in water-type fire extinguishers are: 1. Anti-freeze, 2. Resists evaporation, 3. Prevents stagnation.

For more information regarding the use of calcium chloride in fire protection, write for a free copy of Brief MB-19 "First-Aid Fire Protection With Calcium Chloride." Send your request to the Calcium Chloride Institute, 909 Ring Building, Washington 6, D. C.

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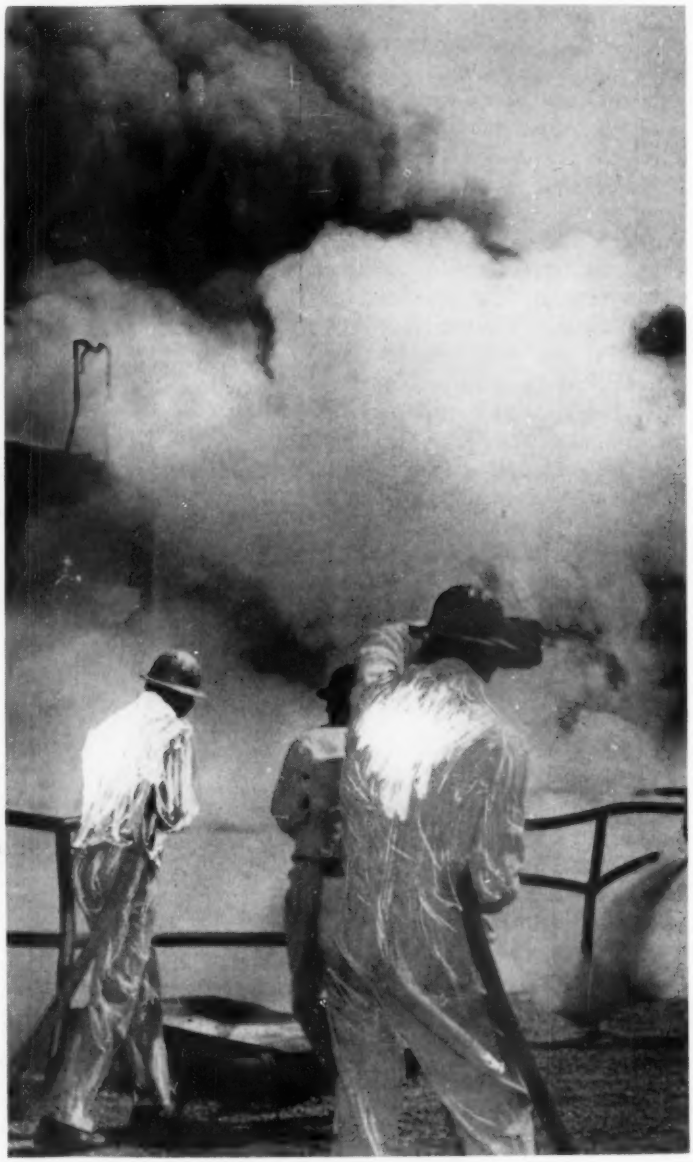
next articles in October & November

New Approaches to Fire Protection



By MATHEW M. KRAIDEN
Director of Research
The National Board of Fire Underwriters

THE ANNUAL FIRE AND explosion toll exacted from our industry in terms of life loss and property wastage is of serious significance. The destruction of nearly 200 manufacturing and mercantile establishments per day warrants greater attention in fire safety by everyone interested in our national well-being. Our rapidly advancing technology has been accompanied by conditions which tend to multiply the risk of fire and also promote the severity and gross destruction. This has been brought about by extraordinary expansion and heavier fire loading in terms of larger buildings units with greatly extended areas and high concentration of costly manufacturing equipment and stock inventories.

The full gravity of the loss potential accompanying our expanding industrial establishments is not ordinarily appreciated, and the cardinal importance of suitable fire prevention programs and adequate fire protection facilities may thereby be overlooked.

The multi-million dollar epoch-making fire at the General Motors Hydramatic Transmission plant provides forceful emphasis of the danger. This has been recorded as the largest single property loss in insurance history, with over-all loss estimates exceeding $50,000,000. Special significance can be attached to the seriousness of this loss when it is cited that it exceeded the sum total of more than 80 of the largest industrial fires and explosions experienced during 1952.

Such catastrophic damage should impel those in administrative and directive control to develop a fuller realization of the insidious nature of fires and explosions and their large-scale destructiveness. Appreciation must also be instilled for the true value of a safeguarding program based on recognized standards

and good practice recommendations of responsible technical bodies, and for the acceptance of such provisions in our various industries and commercial establishments as an operating function on equal footing to production and sales.

Although most fires and explosions are accidental in nature and generally result as unplanned and unexpected occurrences, they have on many occasions been known to have been predictable. And contrariwise, tendencies to minimize and discount similar happenings, by virtue of their seeming remoteness of chance, through so-called "calculated risk," have also been noted on other occasions. Such hunches cannot possibly be calculated despite all the mathematical resources of slide rules and electronic brains—they should, at best, be regarded as products of loose thinking and fallacious subterfuges.

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Preservation of life and irreplaceable wealth in terms of property and capital investment calls for a realistic fire safety consciousness. Fires will continue to occur as long as we have human failure, improper functioning of equipment, and faulty operation of processes. The possibility of error of judgment or thoughtlessness, overlooked unsafe conditions and other human acts of omission require that we anticipate emergencies and be prepared. The probability of fire or explosion resulting in a partial loss should not ever be permitted to enter into the fire safety planning program. Preparing for the extreme potential will promote fuller appreciation of the worst hazards and permit scaling down effective operations to meet any lesser emergency. By the same token, it may be rationalized that the probability of occurrence and extent of damage by fire and explosion is inversely proportional to the safety measures instituted and to the degree of organized preparedness.

A brief consideration of some of the not fully appreciated features of fire should be of value in establishing a proper perspective for prevention and protection progress.

1. No two fires are alike, every individual fire might be regarded as a "tub on its own bottom"—a thousand different situations of fire and explosion have been found involving ordinary combustible and flammable liquids and their vapors, gases and dusts, including pressure rupture and vacuum collapse of equipment.

2. A single fire, if not quickly detected and promptly controlled or extinguished, might destroy in a few minutes what will require months and years to restore or rebuild.

3. The damage from fires is not limited just to "burning," other equally serious destructive effects may be associated, such as smoke and water damage, spoilage by contamination and exposure to the elements (rain, sleet, snow, etc.), breakage due to falling debris and structural collapse, thermal deformation and distortion of precision machinery, reflecting a loss of many man-hours of productive effort. To this damage must be added the loss of vital business records, engineering data, dislocation and transfer of skills and trained workers, not to overlook other indirect losses, such as loss of good will and sales prestige in a competitive market, and the inconvenience of rebuilding and obtaining machinery for replacement.

The severe damage potential of fire can only be fully realized by an understanding of its exceedingly high rate of growth. Fire authorities know that a small fire may triple its size in 1 to 2 minutes, increase tenfold in an additional length of time, and quickly reach a size 50 or perhaps 100 times the original size in a matter of 10 or 15 minutes.

Contributing Factors

In actual full-sized fires, a whole range of factors can contribute materially to a progressive and sweeping fire. These include fuel-feeding in advance of flame by destructive distillation of combustibles through radiant heat and thermal conduction through metal parts and framework, along with contribution of secondary fuels through collapses of structures. To these, must be added such large-scale control factors as inferior building construction, lack of exposure protection and unprotected vertical openings, large undivided areas, heavy loading of combustible contents, and lack of segregation or isolation of hazardous operations.

The foregoing remarks should emphasize the need for a more determined approach toward fire safety. Every worthwhile fire safety program demands concurrent development of prevention-mindedness and fire-protection readiness. A substantial reduction of fire potential can be secured in any industrial operation by a careful scrutiny of the "danger spots" through regularly scheduled inspections and the prompt correction of any improper and unsafe operations or fire vulnerable situations, so revealed. Furthermore, the establishment of a good fire-control emergency plan in terms of properly equipped and action-trained manpower will tend to insure a maximum degree of freedom from fire and explosion losses.

Fire Control

To keep pace with our technological advances in industry, preventive measures and protective safeguards will have to be augmented or improved. Greater alertness to new hazards and increased attention to the growing dimensions of the more common hazards are essentials of

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WELDING CURTAINS—SALVAGE COVERS
to confine the welding operation to a given area
used to protect machinery, and other equipment from water, dust and snow.

MADE OF CANVAS
impregnated with Hooper's Fire Chief treatment under their patent which carries the Underwriters' Laboratory seal.
A. Smith & Son Inc.
Established Eighteen Hundred Sixty-Seven
MANUFACTURERS OF REEVES STRETCHER
Ridge Ave. at Green
Philadelphia 23
"If It's Made of Canvas, We Make It"
(For details, use Key # W-29 on card on page 75)

progressive fire safety planning. Every attempt should be made to provide, as far as possible, the necessary preventive and protective engineering at the blue-print stages to minimize and control the danger potentials.

Special training should be provided for situations presenting unusually high hazards. The misconception that so-called fire fighting merely involves rolling out a length of hose, turning a hydrant and pouring water on a fire must also be corrected. Fire control and extinguishment is gradually developing from an art of firemanship to a highly specialized technical profession requiring rather broad mechanical, electrical, and chemical knowledge and the skill of a variety of manual techniques and detailed familiarity with a wide range of automatic detection and specialized control and extinguishing systems. Fire emergency calls for quick and decisive action, requiring experienced judgment and a high degree of mind and body coordination, plus sound logic to cope with unpredictable situations.

In discussing the present-day advancement of fire extinguishing efficiency, it should be stated that nearly all improvements of any importance have been principally in the techniques of control and application, rather than through new extinguishing media. Cooling and smothering continue as basic principles for the suppression of combustion and extinction of flame. In special instances, various mechanical means have been developed for restriction of fire fuel by quick withdrawal or safe removal of process liquids and gases from the burning area. Another extremely special technique of literally "blowing out" fires has been employed on a limited basis in combatting uncontrollable oil well fires by disengagement of flame through blasting with explosives.

It may be of interest to point out that all extinguishing media in major use today, such as vaporizing liquids or halogenated hydrocarbons (mainly carbon tetrachloride), carbon dioxide, dry powder, and foam have been in existence and in varying degree of use for almost 50 years.

Carbon tetrachloride found its first use in this field about 40 years ago; portable carbon dioxide units first made a limited appearance on the market about 10 years later and found wider acceptance in the late 1930's. Dry powder and foam also had their beginning in the 1900–1925 era—the wider use of dry chemicals has grown rather rapidly in the last 8 years, while there has been little change in the foam principle, although the development of various foam formulations has been quite extensive. Although types and capacities of the extinguishing services provided by these agents have tended to become standardized and to be adopted for various specified uses, important changes have taken place in recent years in the direction of larger-sized portable units, with improved mobility and versatility of operation. There has also been extension of operation, and an increasing use of systems, automatically actuated, to protect various processing equipment presenting special hazards.

Fire Control Improvements

Perhaps the most outstanding of the developments in fire control techniques is the varied and improved application of water. Because of its economic abundance, available force, range of projection, and favorable thermal properties, water is regarded as the best general extinguishing medium—it has no equal for controlling fires of magnitude. Because of its versatility, water is capable of being applied in many diverse ways, and when provided with suitable facilities in terms of mechanical equipment and layout, it may be possible to control or extinguish any type of fire. By conditioning with chemical additives, water may yet approach a perfect extinguishing medium.

The remarkable record of conventional automatic sprinklers is well known in fire protection circles. A new sprinkler head of recent de-

velopment—the automatic spray sprinkler—now provides, with better atomization and distribution pattern, quicker control of fires, greater protection of ceiling areas, with reduced water requirements and lessened water damage.

Fine sprays and water curtains are being utilized to encompass hazardous areas and restrain the lateral spread of vapors and transmission of fire by radiation and convection to adjacent surroundings. To minimize the spread of fire and prevent structural collapse, fixed sprays and waterfog systems are also being installed around reaction vessels, fractionating towers, and around columns and supporting beams of open steel construction in critical process areas in chemical and petroleum refining operations.

The use of fog nozzles on hose lines by fire departments has resulted in a greatly increased efficiency over the ordinary solid streams in certain types of fires. The higher rate of heat transfer and faster cooling provided by dispersed water fog is currently stimulating a keen interest in an extinguishing technique for interior fires, known as "indirect application of fog."

Another growing technique finding increasing use in manual fire control operations involves the addition of "wetting agents" to water. These additives enhance the penetrating and spreading qualities of water (by virtue of the lowered surface tension) which is reported to be quite effective in the wetting and cooling of water repellent surfaces and in extinguishing deepseated fires commonly encountered in fibrous materials. Other similar chemical additives have recently been introduced to promote emulsification and froth formation of foam blanketing with water sprays and immiscible combustible liquids.

Most of our other developments in fire extinguishment are tending toward combining the various advantages of different systems into a fixed high-capacity installation for large-scale protection, coupled with automatic controls. One such new arrangement permits the injection of a foam liquid into a spray sprinkler system to provide a snowstorm-like discharge of finely subdivided foam. Somewhat similar applications are being developed with dry chemical media for the combat of fires arising from the use of molten salts and liquid metals employed as industrial heat transfer media.

An example of the extreme extent of new developments in this field is indicated by a rather unique fire control method for oil tank fires. This process employs the principle of agitation to restrict the release of vapors from hot upper strata of stored liquids by movement of the cooler liquid from the depths of a container to the surface. This tends to diminish the rate of vaporization either to extinguish the fire or reduce the intensity or rate of burning to permit easier extinguishment by other conventional cooling and smothering methods.

The fundamental concept that small fires are easiest to control is

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POWDERED SKIN CLEANSER

THE MOST EFFICIENT SKIN CLEANSER MADE!

A HEAVY DUTY SKIN-CLEANSER without a peer in the industrial field. It has a high anhydrous content and is superfatted for extra mildness. This super mild soap is scientifically blended with an edible corn meal scrubber and a special skin emollient to give thorough, safe cleansing to the dirtiest hands.

COMMODORE—Same formula as "Treet" but extra coarse. Ideal for those who prefer a "rough feeling" soap, yet one that will leave the skin soft and smooth.

An Invitation—We will be glad to send detailed information and prices on these products, and invite you to ask for free sample quantities. No obligation, of course.

LIGHTFOOT BAR SOAPS

PLAIN CUT
Made for industrial use—office washrooms, plant showers, etc.

"24 HOUR" DEODORANT SOAP
A mild toilet soap containing G-11 (Hexachlorophene).

AVADERMA DRY SKIN SOAP
Contains milk solids and lanolin for extra mildness.

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Send trial sample and information on the following:

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Firm .....

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(For details, use Key # W-30 on card on page 75)

perhaps responsible for the accelerated interest in automatic detection and control and the rapid progress that is developing in this particular field. In recent years, automatic detection, reporting and control of fires has progressed far beyond the stage of a few crude bells and thermostats.

The newer developments reflect a scientific art and include various principles of chemistry and physics to provide prompt detection through thermal expansion of solids, liquids, and gases, vaporization of liquids, ionization and microanalysis of gases, change resistance of conductors, including thermoelectric effects of thermocouples, and photoelectric flame and smoke detection. A wide variety of instrumentation is currently available to provide automatic and continuously supervised fire and explosion safeguards for all types of hazardous situations in different industrial operations.

Some of the systems are arranged with interlocks to effect multiple action, such as shutting-down fans and motors, slamming doors and windows for prompt isolation of the fire and smoke, in addition to actuating alarms and extinguishing devices. It may be that developments in radar, television and in the automatization of our industrial production will insure greater operating safety and provide servomechanisms that will stimulate even greater advances in the expanding field of automatic fire control.

Better Use of What We Have

It should be readily apparent that there is a sufficiency of equipment and techniques available to provide adequate safeguards for practically any existing hazardous operation. As a matter of fact, it is not so much a problem of developing new fire safety procedures and extinguishing media as it is a problem of better utilization of the prevailing measures and accepted controls already in existence. Deficiencies in fire prevention and fire protection, even if of a seemingly minor nature, can create potentially dangerous hazards and endanger operating personnel, equipment and their structures.

An inseparable part of this task is education to develop a fuller appreciation of the scope of the hazards, means for their avoidance and control, and the necessity for complete adherence to established safe practices and preventive maintenance programs. The success of such an undertaking ultimately must reside in the competency and diligence of the safety and fire protection engineers, and in turn on the continuing support by the plant management. These technical specialists must also assume the primary responsibility of alerting the management to fire vulnerability and loss potentials, and convincing them of the serious need for instituting proper organizational effort and eventual compliance with recognized fire prevention and protection standards.

Two final points are worthy of mention. First, there is a need for more long-range planning to meet the trend toward structural "bigness" and increased concentration of values in such occupancies; and, second, some advance thought must also be given to the problem of maintenance of industrial production under conditions of direct military action. Both of these considerations seriously increase the dimensions of the industrial fire and explosion safety problems.

In this connection, the trend toward decentralization or dispersion of our industry and demands for expansion of acreage for future developments is gradually shifting some of the industries to rural areas lacking the required fire fighting equipment and having inadequate water supplies.

On the other hand, flow modernization and flexibility of layout and machine arrangement demanded by mass production operations is calling for expandability in terms of large undivided areas and economic engineering design and light construction.

From an address at the 41st National Safety Congress.

I KNOW I'M SAFE... with WOODEN SOLES!

One costly FOOT ACCIDENT could have paid for

1000 PAIRS of WOODEN SOLES

Reece has a shoe or sandal to fit your needs.

See them at

BOOTH 115

They Insulate

They are Puncture Proof

There is no substitute for Reece Wooden Soles

REECE WOODEN SOLE SHOE CO.

Dept. SM-9 Columbus, Nebraska

(For details, use Key # W-31 on card on page 75)

Employees Win Suggestion Awards

IN A NEW SUGGESTION plan initiated by the Mount Vernon N. Y. Plant of the North American Philips Company, 3 employees have received the first awards. Vincent Sokol submitted an idea which eliminated one tooling set-up in the manufacture of X-ray analysis equipment. His suggestion also saves time and labor and provides a better machined surface. Joseph Angilello received 2 awards. One covered a method for pulling small wires through spaghetti tubing. He solders a 6" piece of copper braid to the end of a length of #8 solid conductor. Small wires are inserted into the braid opening and the device acts as a grip in pulling. Helen MacCracken received a cash award for several suggestions to improve safety and convenience in the ladies rest room.

Circus Safety

(Continued from page 39)

permanently secured under steel collars. This type of fastener does not unbalance or destroy the rope structure like the tucks of a hand splice.

Does the circus have an actual safety program? Yes. A deceptively simple one. It consists of close supervision of all personnel—each supervisor responsible for the safety of his crew. With almost 1,300 permanent employees, the circus is highly departmentalized. A supervisor must report any accident, however minor. Each one is recorded. Each is carefully studied to determine whether a change in method or shift in personnel could avoid a similar one. When accidents recur, everyone "gets into the act" to see if collective thinking can come up with a solution.

Actual physical safety devices are few. Safety gloves are insisted upon for certain workmen because the majority of dispensary calls are for hand injuries. Each performer checks his own equipment before the act. This is a psychological safety precaution. Actually, qualified prop men have checked all equipment, but performers feel more secure if they have looked it over personally. When there is substitution of new equipment, such as the new wire rope rigging for the trapezes, each member of the performing team is informed why this equipment is safer. Practice sessions are called so the performers can become accustomed to any different features of the new equipment.

The circus thrives on danger—or rather, on what looks like danger. But as one circus veteran of some 40-odd years boasted, "The most serious accident I've ever had was when I burned my tongue on a cup of hot coffee from the cook kitchen."

Pictures by courtesy of American Chain & Cable Co., Inc.

Clean...Dry...*Slip-safe* Floors
IN JUST 90 SECONDS!

The picture tells the story! Two men operating as a team with HILD Equipment can *scrub and dry* floors under and around machines...while operator steps aside for 90 seconds or less. HILD Equipment goes right to the edge of machinery...leaves no slick film to cause slip hazards. The same equipment may be used with numerous attachments to perform scores of clean-up jobs in factory and office.

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ONLY HILD
HAS THE PATENTED
SHOWER-FEED BRUSH
Refillable, when bristles become worn, by merely attaching new refill block. It's done with a screwdriver in 5 minutes or less.

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(For details, use Key # W-32 on card on page 75)

Safety Contests

(Continued from page 12)

for these names, these numbers were called. The person answering the phone was asked to quote the month's safety slogan. If the answer was correct a cash prize was awarded. If no one answered the phone, another name was selected and that telephone number called. If the name of a person who had no home phone was drawn, a representative of the company visited his home to ask the same question.

Before this contest could lag, a new one, in which awards were given for the best suggestions on improving plant safety, was begun. Another contest in the form of a guessing game followed. A safety hazard was placed in a sealed box and employees were invited to suggest what "The Thing" inside might be. At the end of several weeks the box was opened and was found to contain improper and unsafe footwear. The closest guesses brought prizes to the employees who made them.

The continuing chain of safety contests next produced a type in which a book of matches bearing a safety slogan on the cover was given out to each employee at the beginning of each week. During the week a portion, or key word, of the slogan was posted on bulletin boards throughout the plant. During the following week, those whose names were drawn were contacted and asked to repeat the key word only. The ten winners received a silver dollar each. At the end of 12 weeks, the names of the 120 winners were placed in a box. The name drawn was a grand prize winner, receiving a cash award.

During the latest contest, candy bars were distributed to employees every two weeks. Each employee was asked to save the enclosed numbered safety slogan card. Each employee received a total of three cards —one red, one white, and one blue. At a safety meeting, numbered cards were drawn from a box. The numbers drawn made the persons holding them eligible for a grand prize, provided the cards were red, white and blue. Numbers drawn with other colors were eligible for lesser prizes. A lost-time accident during the contest meant that no prize was awarded until 3 periods of approximately 2 weeks each passed without a lost-time accident. If an accident caused lost time, a stick of gum was given instead of candy.

The contest just concluded using candy bars as prizes stimulated a great deal of interest among the employees. If any of them were missed when the candy was handed out, their supervisor heard about it. If chewing gum was handed out, they wanted to know to whom, where, how, when and why. They exchanged the cards among themselves to try to get a winning combination. These things indicate interest, and safety is a daily topic of conversation among them.

Although our records are yearly averages and not correlated with the chronology of our safety contests, we are definitely convinced that these contests contribute greatly to a good safety record. At the same time, we hesitate to speculate on what could have happened had we not run them.

Contests can cost a little or as much as desired. The Safety Poker contest currently operating cost us 100 dollars per week (500 employees) while it was running the first time in 1949. The candy bar contest costs between 15 and 20 dollars per week. We are presently operating on a budget of about 1000 dollars per year for contests, or about 2 dollars per employee per year.

Date	Type of Contest	Rate Freq.	Rate Sev.
8–49	Safety Poker	5.13	0.1395
1–51	Safety Slogan (family participation)	"	"
6–51	Safety Suggestions	"	"
9–51	No. Safe Days Worked	3.01	0.1592
3–52	The Thing	2.28	0.6993
3–53	Matches	"	"
9–53	Candy Bars	2.91	0.1319
4–54	Candy Bars Revised		

A few simple suggestions for a successful contest:

(1) The type of contest and how it is handled should be adapted to your particular plant. Your accident records will help you determine this.

(2) It must stimulate interest, and it must be fun.

(3) It should be run by a committee composed of your supervisors and other employees.

(4) You should change the type of contest from time to time, but keep one running continuously.

(5) You should make the contest competitive for a prize of some kind.

(6) *All* your employees—shop, office and drawing room—should be able to participate on a fair basis.

(7) You should publicize it, and not allow it to drag.

Many employees work safely because they realize that accidents not only result in personal suffering, hardship for their families, and loss of pay, but also reflect on their efficiency and ability. Other workers may not respond to these reasons for avoiding accidents, but their interest in competitive safety contests ***may*** persuade them to co-operate and develop safe habits.

Remember, contests are only a means to an end. They are no substitute for the daily watchfulness and teaching that must go on. Our job will never be finished until we get all our employees safety-minded to the point where they work safely, not to avoid discipline for failure to observe plant rules, but voluntarily and thinkingly for the benefit of themselves and their associates.

Pictures by courtesy of Lehigh Structural Steel Company.

TRANSPORTATION SAFETY

PUNCTURE SEALER

UP TO 80 PERCENT fewer tire or tube punctures on trucks and passenger cars are claimed for fleet operators by injecting a new sealing compound into their tubes. Tested in daily use on the Pacific coast for more than 14 years, the compound is being made available for the first time to fleet operators across the country.

A scientifically compounded product, the material immediately seals all small punctures and allows vehicles with larger punctures to proceed to their destination with a minimum loss of air and no loss of valuable time. Requiring only a few minutes per wheel, it can be injected into tubes without removing the wheels from the vehicle and while the tires are inflated. Road and laboratory tests indicate the

compound will remain permanently effective in high and low extremes of temperature. Tests also show that it adds to the life of tubes by reducing overheating.

Operating reports from companies using the sealing compound on different types of vehicles and operations show it repays its low initial cost many times over by adding to the life of tires and tubes.

(For further details, use Key #TS-6 on free inquiry card on page 75)

Grim Reminder

WHEN SOME 21,000 Caterpillar Tractor Co. employees at the company's Peoria, Ill. plant punched out at the time clock for the last time before the long-awaited annual two-week vacation, and poured out through 9 main gates, they were met by a grim scene. Mindful that 3 employees were killed while on vacation last year, the company had placed 9 smashed-up automobiles at the various exits.

"We wanted to alert our people to the fact that some drivers are murderers on the highway," H. S. Simpson, safety manager, said.

Signs over the wrecked cars read:

"This car was driven by a man who isn't able to take a vacation."

Folders entitled "Killers on the Loose" depicting scenes of fatal accidents and listing speeding, carelessness, drinking and discourtesy as the major cause of traffic fatalities, were distributed to the vacation-bound workers by plant protection and safety personnel.

Later when the vacationers returned, the accident score was added up to see if this shocking reminder had been effective. Wherein last year 3 employees died on vacation—no fatalities occurred this year and only 2 minor injuries were suffered from auto accidents.

Driver Education Reference Book

DRIVER EDUCATION has assumed an increasingly important position in the curriculum of the nation's high schools, colleges, and universities during the last 18 years. From a pioneer course at Pennsylvania State College in 1936, the subject has advanced to a present total of well over 425 courses in more than 200 colleges throughout the 48 states. Of the more than 20,000 high schools in the country, over 6,000 have training cars and conduct complete driver education programs. Several thousand others give some classroom instruction.

"The staggering figures of death, injury, and property loss for just one holiday weekend should be enough to convince the public and educational skeptics that driver education is an essential part of the

preparation of every youth for effective living in today's and tomorrow's society," according to Dr. Herbert J. Stack, director of New York University's Center for Safety Education, and co-editor with Dr. Leon Brody, director of the NYU Center's research and publications, of the first college text book on "Highway Safety and Driver Education." The new 464-page book has 24 chapters which contain the combined knowledge and research of 55 traffic engineers and enforcement officials, college and high school instructors, and insurance and state safety agency officials. The work includes chapters on highway and traffic engineering, motor vehicle administration, car construction and maintenance, organized traffic safety programs, and a complete treatment of driver education.

In the volume, the safety men predict a continuing period of growth for driver education. They note that in one recent year, in Pennsylvania, the number of schools using training cars increased nearly 20 per cent. Classroom instruction in Wisconsin doubled in five years. Dr. Stack and his colleagues suggest in their book that school administrators alter the scheduling of driver education from the senior to the sophomore year.

"This change is necessary if the schools are to reach a maximum number of future drivers," they state. "By the present system there are two groups that are not reached, those who drop out of school to go to work and those who have already learned to manipulate a motor vehicle sufficiently to meet the minimum requirements for a driver's license. Both groups are predominantly male and may well be the more important of all our future drivers. Many cab and small truck drivers come from these groups. As more and more commercial companies set up their own training programs, many of these men will be taught in this manner, but the economic waste in terms of cost and time of erasing old undesirable skills, habits, and attitudes is much greater than is apparent.

In the preface to "Highway Safety and Driver Education," Dr. Stack explains that his book is, in a sense, a pioneer work designed to fill a definite need. For years, the preparation of teachers of driver education depended upon secondary school texts and a variety of pamphlets and other material. The new book will eliminate that handicap, he states, and will serve as a valuable reference work for all persons concerned with driver education and the general problem of traffic safety.

For Safety's Sake . . .
Buy GOLD SEAL

HICKORY HANDLES

- ★ Long and Hard Service
- ★ Triple Inspected
- ★ Made Only with Second Growth Hickory
- ★ Greater Strength - Less Breakage
- ★ Perfect Shape
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Eye end of each handle is slit for wedge, for which metal and wood wedges are included — at no extra cost. Sold only through your jobber salesman.

Manufactured by
LA PIERRE-SAWYER HANDLE COMPANY
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(For details, use Key # W-33 on card on page 75)

New Stop Light Colors?

UNDER THIS SAME title a story suggesting new colors for traffic lights was published in the August issue for its news interest as an expression of opinion. Several readers have challenged some of the statements and deductions made in the article. Reader reactions may be summarized as follows:

The story is based on the assumption that many of the accidents caused by "failure to observe" traffic signals are the result of drivers' "inability to see" or distinguish the colors. Is this basic assumption accurate? Also, if drivers themselves do make this claim, is such a claim an alibi for careless driving?

The article further suggests that because many color-blind people are really only red-green blind, they cannot distinguish the traffic light colors, and that therefore other colors, such as blue and yellow, should be used instead. These two conclusions have been questioned on the grounds that the standardized traffic lights we have had for 20 years

FOR SAFETY'S SAKE . . .
DAV-SON FLASHING SAFETY DIRECTOR
With Amazing Changeable Letter Slide Out Panel

Bright traffic light red, green spots flash "SAFETY FIRST." Color, motion, light bring eyes directly to message. Only DAV-SON has changeable letter design with removable panel for quick changes, peak attention. 98 red 3½" and 250 black 1⅞" acetate letters in compartment box incl. Size 18½x29x6. Complete with lamp and U.L. Cord. **$39.75**

Insist on genuine self-sealing cork back bulletin boards—hardwood frame. Sizes 12x18 and larger. With or without glass doors. **$4.15** up. Also with metal frames for inside or outside use.

A Dav-Son board for every purpose. Over 100 different sizes and styles to choose from. *Dealer Inquiries Invited.*

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(For details, use Key # W-34 on card on page 75)

are made in accordance with the code of the American Standards Association that calls for a shade of green with considerable blue in it to help the red-green blind. With standardization also the red light always appears at the top and the green at the bottom so that the color-blind can tell whether to stop or go according to which light is on, even if they can't distinguish the actual colors.

Progress requires change, but we wonder if color-blindness is really as much of a problem as suggested and if the change to a blue-yellow system would actually benefit the color-blind and be worth the change-over confusion.

No. 200 Asbestos Gloves
Lined or unlined. Plain or leather reinforced. 11, 14, 23" length.

For Safety Get Quality Asbestos Gloves

Only quality can put full safety into asbestos gloves. Steel-Grip asbestos safety gloves are quality throughout. The quality starts with the asbestos cloth . . . Underwriters' Grade 2½ lb. per square yard. You find quality in the design ...seamless one piece construction from tip to top. No seams at wrist or working edges to pull out or burn just when protection is most needed on the job. Double sewn throughout. Full cut for cool, comfortable fit.

And the manufacture is of the quality that made Industrial Gloves Company the leader for 43 years. Gloves and mittens, both plain and leather reinforced, your choice of lined or unlined, made in standard lengths of 11", 14", and 23". Special lengths to your requirement. Knitted cotton lining, 8 ounce weight, is our standard lining. Knitted linings allow quick dissipation of heat. Special linings available. A complete line of asbestos safeguards for every job hazard. Tell us what you need. Catalog free.

No. 250 Asbestos Mitts
Reversible, worn either hand giving double service. Lined or unlined, 11, 14, 23" lengths.

No. 225 Leather Reinforced Asbestos Gloves
Leather palm, fingers, thumb. 11, 14, 23" lengths.

No. 280 Leather Reinforced Asbestos Mitts
Palm, back and thumb, reinforced with heat resistant leather, 11, 14, 23" lengths.

INDUSTRIAL GLOVES COMPANY
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Steel-Grip INDUSTRIAL Safety Apparel
TRADE-MARK

To be sure of the Genuine Demand this Trade Mark

(For details, use Key # W-35 on card on page 75)

Safety Editor Chooses Safety Liner

EDITORS AS A CLASS ARE SUPPOSED to be an inconsistent lot often viewing with alarm or pointing with pride to the same subject. But when Harry Armand, Editor of SAFETY MAINTENANCE, sailed for Europe last month he chose without hesitation the super-safe queen of the American merchant marine, the superliner S.S. "United States," flagship of the United States Lines.

Holder of the blue-ribbon trophy for speed records across the North Atlantic, the giant superliner is known as the safest ship afloat. Equipped with top-secret navigating devices and built to Navy specifications, the "United States" boasts every proven safeguard known to modern maritime design. Fire aboard the superliner is indeed unlikely as the only wood in her construction is that used in the pianos and the tops of the butchers' chopping-blocks. Completely fireproof, fire-resistant and fire-retarding materials and fabrics have been used throughout and even the deck rails, traditionally of wood since the beginning of marine history, are fireproof metals on the United States.

The ship has the ability to withstand collision in a manner never before achieved in a passenger liner and more than twice that required by international standards. Automatic fire detecting devices and fire fighting equipment, metal life boats, metal furniture and decorative wall panels of completely fireproof construction surround passengers and crew with full protection at sea and in port.

Damage Control

William F. Gibbs, internationally known naval architect whose firm designed the ship states that the "United States" literally has a hull in the form of a "double skin." Additional safety is provided by a centrally located damage control center in which are located all controls, annunciators, detecting equipment and means of intercommunication for complete safety around the clock.

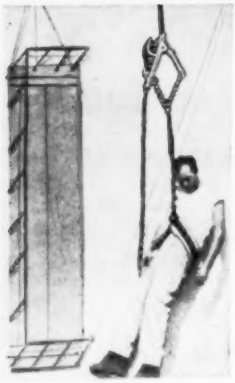
Mr. Armand will visit France, Spain, Germany, Austria and Holland returning later this month.

Sights on Safety

THE THREE GRAND prize winners in the 1953 Safety Directors letter contest have been announced by the American Trucking Associations, sponsors of the annual "Sights On Safety" program. They are: Donald H. Axe, owner, Axe & Arthur Motor Express, Syracuse, N. Y.—companies traveling under 1 million miles annually; Leonard Knowles, safety director and transportation supervisor, Pacific Supply Cooperative, Walla Walla, Wash. —1 to 5 million miles annually; and E. R. Crippen, safety director, West Coast Fast Freight, Inc., Seattle, Wash.—more than 5 million miles annually.

"Sights On Safety" is a continuing program designed to reduce accidents and promote safe and courteous driving. Drivers are awarded "prize points" redeemable for merchandise for both care in driving and for maintenance of their trucks.

STOP THAT FALL



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Locks automatically, instantly. Slips onto ordinary rope lifeline. Moveable up or down with man. Instant locking position at all times, whether stationary or being moved up or down.

Snaps into safety belt: No adjusting. Inexpensive. Overall length approx. 13". Does not harm rope. Weight: approx. 5 lbs.

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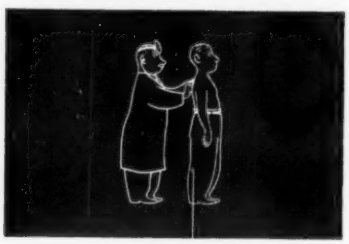
(For details, use Key # W-36 on card, page 75)



...before it TALKS

...is the way our doctors put it—"Our chances of curing cancer are so much better when we have an opportunity to detect it *before it talks*."

That's why we urge you to have periodic health check-ups that *always* include a thorough examination of the skin, mouth, lungs and rectum and, in women, the breasts and generative tract. Very often doctors can detect cancer in these areas long before the patient has noticed any symptoms.

For more life-saving facts phone the American Cancer Society office nearest you, or write to "Cancer"—in care of your local Post Office.

American Cancer Society

inside the trade

The Board of Directors of Torit Manufacturing Company of St. Paul, Minnesota has just announced the election of William L. West as President of that company. Mr. West is a graduate of Harvard Business School where he obtained a Master's Degree in factory management. He comes to Torit after 15 years association with the Automatic Control Company also of St. Paul. At Autocon he served first as Treasurer and, for the past eight years, as President.

Mr. West succeeds Edward J. Girk, who has resigned from the office of President in order that he might devote his time largely to sales promotional activities. Mr. Girk is returning to the office of Vice President and Sales Manager in which capacity he served for ten years prior to assuming the office of President in 1952. Other officers elected at the recent Board meeting were: Lawrence F. Koering, Treasurer and George A. Huna, Secretary.

General Electric has opened its new Schenectady Industrial Clinic, staffed by five full-time physicians and 31 nurses and technicians, which includes an operating room, dispensaries for men and women, x-ray facilities, clinical laboratory, industrial hygiene laboratory and a two-stall ambulance garage.

The clinic provides free medical services for Schenectady GE's 37,000 employees and averages 30,000 visits a month. The fully-equipped operating room, where minor surgery is performed in emergencies, averages 100 patients a month.

Wilcox Engineering Company, 4200 Montgomery Road, Cincinnati 12, Ohio, is now the representative in Cincinnati and Dayton, for DeBothezat Fans Division, American Machine and Metals, Inc., East Moline, Illinois. In addition to the cities mentioned, Wilcox will also be active in southern Ohio, southeastern Indiana and northern Kentucky. Columbus, Ohio and the area east of that city will be covered for DeBothezat by United Equipment Company, 539 East Town Street, Columbus 15, Ohio.

S. C. Bratton Sales Engineers, Ltd. have also been appointed sales representatives in the state of Alabama. The Bratton firm, at 405 American Life Building, Birmingham 3, Ala. are engineers in the heating, ventilating and air conditioning field.

Gilbert E. Cain, safety supervisor for Hercules Powder Company's plant at Parlin, New Jersey, has been named assistant to Charles L. Jones, safety engineer for the company's Engineering Department in Wilmington, Delaware.

The appointment of Elmer R. Kaiser, Columbus, Ohio as the new Director of Research for the American Society of Heating and Ventilating Engineers has been announced by Louis N. Hunter, President. Mr. Kaiser was appointed to the post by the ASHVE Council and will assume his new duties at the Society Research Laboratory, 7218 Euclid Avenue, Cleveland, Ohio.

Since his graduation from the University of Wisconsin with a B.S. and M.S. in Mechanical Engineering in 1934, he has been actively engaged in research work particularly in the field of fuels and during the past 20 years served on the staff of Battelle Memorial Institute, and with Bituminous Coal Research as Assistant to the President, Assistant Director of Research, General Manager of B.C.R. Products, Inc. and Associate Director of Research in charge of the B.C.R. Laboratory at Columbus. In his professional work, Mr. Kaiser has had wide administrative experience, the planning and supervision of important research programs and has written extensively on subjects dealing with combustion, heat generating equipment, air pollution and utilization of coal.

Breuer Electric Mfg. Co., has announced the appointment of Irwin Burton as a regional sales manager for the company's line of vacuum cleaners, floor machines and portable electric blowers.

Mr. Burton has been with Breuer since 1941 with administrative duties in both purchasing and sales. He will head regional sales in the states of Minnesota, North Dakota, South Dakota, Iowa, Nebraska, Colorado, Wyoming, Kansas, western Missouri and western Wisconsin.

Permatex Co., Inc., Brooklyn, N. Y. has established a special research-consulting group that will work jointly with industrial and insurance engineers to help prevent damage caused by leakage and seepage through the use of proper sealing compounds. The new department is equipped with complete laboratory test and development facilities.

Appointment of Clifford A. Mikus as plant engineer for Pittsburgh Plate Glass Company's new Greensburg, Pa., opera-

tions has been announced by Miles Wright, superintendent.

A native of Pittsburgh, Pa., Mr. Mikus is a graduate of Carnegie Institute of Technology. During the past three years, he has served as chief design engineer for Oliver Iron and Steel Corporation at Pittsburgh.

Plax Corporation, Hartford, Conn., has sold to Westlake Plastics Company, Lenni Mills, Penna., its entire productions equipment, applicable patents, etc., for extruding plastic rods and tubes and for molding heavy-gage plastic sheets. The Plax Management has sold this part of its operations to provide needed space and permit concentration on its rapidly growing "squeeze-bottle," and extruded film and oriented sheet businesses.

The Clark Equipment Co. has appointed as its new sales and service representative for Clark fork trucks and other materials handling equipment in the New York City, Westchester and Long Island area the George Industrial Equipment Co., Inc., 11th Ave. at 50th St., New York 19, N. Y. General Manager for the sales and service will be C. W. Meldram.

William H. White of Wilwite Associates, Oakland, California, has been named regional sales representative for Washington, Oregon, Nevada and California, by Parker Sweeper Co., Springfield, Ohio, manufacturer of industrial floor sweepers.

The Wilton Tool Mfg. Co. Inc. has begun construction of a new general office and factory building at 9525 Irving Park Road, Schiller Park, Illinois. According to Wilton's President, Mr. Hugh W. Vogl, Wilton will move to the new plant in January of 1955; and that no major interruption of production or delivery schedules is anticipated for their line of vises, work positioners and c-clamps.

A new multi-million-dollar sound laboratory and test center for the world's most powerful transformers will be built at Westinghouse Electric Corporation's Transformer Division plant in Sharon, Pa.

Frank L. Snyder, vice president in charge of this major Westinghouse division, said the new transformer "indoor proving ground" will be ready for operation by early next year.

Federal Sign and Signal Corporation has been announced as the new name for Federal Enterprises, Inc. by William W. Scott, president of the company. The Chicago firm is a leading manufacturer of electric signs, sirens, horns, bells and related signaling equipment.

Save Money!
Save Fingers!
SECOND FINGER $1,050.00
FIRST FINGER $1,200.00
THIRD FINGER $750.00
FOURTH FINGER $600.00
THUMB $2,100.00
ENTIRE HAND $5,100.00
Cost of Amputated Fingers
It pays to keep fingers out of presses!
AIR BLAST VALVES
Eject parts at each stroke of Press. PRICE $29.00
PRES-VAC SAFETY FEEDERS
Blanks are fed to a press from a safe distance of 14 inches. PRICE $35.00
Prices F.O.B. Plant
F. J. LITTELL MACHINE CO.
Speed with Safety
AIR DIVISION
4187 RAVENSWOOD AVENUE
CHICAGO 13, ILLINOIS
District Offices: DETROIT and CLEVELAND
Write for FREE Catalog

(For details, use key # W-7 on card on page 75)

TOUGHEST WHERE WEAR IS ROUGHEST

Standard abrasion tests show Tripl-Palm will outwear by many times the usual coated glove. It's an extremely heavy Vinyl coating on the palm (main point of wear) that does the job, yet it is still a soft and pliable glove for hand comfort.

NO SEAM HERE The wing thumb construction multiplies glove life. All sizes and styles available from your Jobber or write direct.

In Canada, Safety Supply Co., Toronto

THE SURETY RUBBER CO.
Carrollton, Ohio.

(For details, use Key # W-38 on card on page 75)

What's New . . .

For your convenience in obtaining descriptive literature of products listed here, use the Reader's Inquiry Card. Just write in the code number given with each item. Or send written requests to:

Service Dept.,
SAFETY MAINTENANCE & PRODUCTION

AIR & WATER POLLUTION CONTROL

(Use Key # 666 on Inquiry Card on page 75)

SURVEYS, analyses, and consultations are offered by Emmet Technical Associates for the prevention, control and abatement of air pollutants, including gases, dusts, fumes, odors etc.; industrial and domestic wastes, both water-borne and solid. This service is available to industry and municipalities.

FLASHING LIGHT

(Use Key # 667 on Inquiry Card on page 75)

A BLINKING warning light which operates on 4 standard flashlight cells is announced by the Justrite Manufacturing Company. Called the "Life Guarder", the new warning light is designed to protect motorists forced to make car repairs on dark roads. With a red flashing beam visible for miles in every direction, the light warns oncoming motorists of danger ahead.

The light is also convenient for a number of other uses: marking hazardous locations, in camp sites, yards and industrial areas; acting as a beacon on docks, beaches etc.; warning of storage sheds of flammable and explosive materials; and many other uses both in the home and in industry. It also can be quickly converted to a steady white light by simply removing the red lens liner and switching the flasher unit to "Off." In this form the light is suitable as a general lamp for lighting tents, camp sites, work areas, etc.

MUFF TYPE EAR PROTECTORS

(Use Key # 668 on Inquiry Card on page 75)

THE Straight-away muff-type sound protectors, developed by the David Clark Company, Inc., give protection against both high- and low-frequency injurious noise and are safe, sanitary, and comfortable to wear. They require no special fitting, are plainly visible to supervisory personnel, completely washable, and non-irritating to the skin.

To meet industry's varied demands, three styles are available: (1) Medium weight cotton helmet; (2) Lightweight, cool nylon-mesh helmet, and (3) for intermittent use, the headband type. Helmets, available in gold, green, or brown, are designed for use with safety goggles and hard hats. Headband type, in black or white, permits use of safety goggles.

Since constantly higher machine speeds are rapidly creating more dangerous noise-levels throughout industry, these protectors may be of vital interest to the petroleum, construction, and manufacturing fields. The manufacturer states that they have been fully tested in the laboratory, in consultation with Worcester Polytechnic Institute scientists, and in the actual manufacture and testing of guns, jet engines, and similar high noise-level operations.

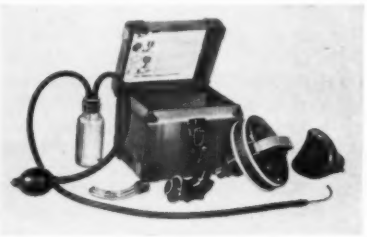
RESUSCITATOR-ASPIRATOR

(Use Key # 669 on Inquiry Card on page 75)

TO answer the demand for an aspirator for use in conjunction with the portable, manually operated Kreiselman bellows resuscitator, the Ohio Chemical & Surgical Equipment Co. (a division of Air Reduction Company, Inc.), is now supplying the Model 116 resuscitator, complete with aspirator, mask, airway, and mask elbow, in a handy carrying case.

The device features automatic valves and safety devices. Gases from the lungs cannot mix with the contents of the bellows, and the unit can be used efficiently regardless of the patient's position, and either with or without oxygen. A mask elbow is provided for use when patient is in prone position. Artificial respiration may be started immediately with air, and, if necessary, oxygen may be added when available without interrupting the procedure.

The resuscitator consists of a bellows of about 1600 cc capacity, a face mask, and a valve placed between them. There are valves for the intake of air and oxygen, and a safety valve which limits pressure



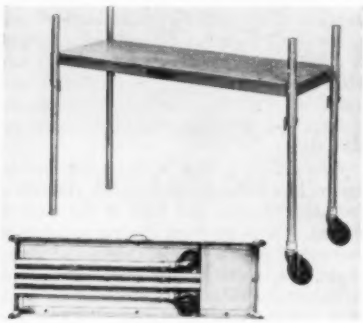
to 20 mm. Hg. All valves operate automatically. The bellows is operated at the normal respiratory rate of about 15 to 18 per second. When pressure of the hand against the bellows is released, following inflation, the valve leading to the bellows is immediately closed. By this method, noxious or inert gases can be expelled from the lungs in a short time. It is impossible to build up carbon dioxide. When oxygen is used, a flow of 5 to 8 liters per minute is introduced. This gives between 50 and 60 per cent of oxygen when 500 cc. are used for each inflation. It is necessary to inflate the lungs only to a point where the chest is seen to rise. A patient who has been apneic usually has irregular or feeble respiratory efforts and does not take in sufficient air or oxygen. To remedy this condition the face mask is kept in position with the bellows distended, and with each effort at inspiration the bellows is compressed. When regular breathing has been established, the resuscitator is removed.

EXTINGUISHER CABINET

(Use Key # 670 on Inquiry Card on page 75)

IN order that industrial plants may be sure that fire extinguishers are not tampered with and are in working condition when they are needed, Erie Safety Products Co. have placed their Tam-Pruf Fire Extinguisher Safety Box on the market.

The box is painted red for positive identification when the extinguisher is needed. Locked by a padlock and seal which is quickly broken by easy pressure of the hand against the breaker-arm, the safety box opens to permit easy removal of the extinguisher—the glass seal falling into a special receptacle. This prevents injury to hands, face or eyes from flying glass or ragged edges. The padlock remains in a locked position on the side of the Safety Box. A new seal can be inserted when the box is ready to be relocked. The box has glass panels on either side to allow easy inspection of the extinguisher, and the entire unit also keeps the extinguisher free from grease, dirt and grime.



ADJUSTABLE PLATFORM

(Use Key # 671 on Inquiry Card on page 75)

THIS portable platform and table unit, announced by Bil-Jax, Inc., is made of tubular steel, angle iron and plywood. It serves as a work platform, mason's mortarboard, or as a table. Individual leg adjustment makes it suitable for use on stairways or uneven surfaces. For carrying, unit is fitted with convenient handle, and legs are held in place with friction catch. Top surface is 24" x 48", and overall weight is 47 lbs. Legs are 30" long, of ½" tubing. Gravity pins are used in making leg adjustment.

WEED KILLER

(Use Key # 672 on Inquiry Card on page 75)

THE Knox Chemical Company has developed a new weed killer tailored to the specific requirements of industrial weed control. Under the name Knox-All, this new general weed killer eliminates vegetation and is equally effective at any time of the year. Its weed destroying potency is unaffected by rain or sun. One spraying is said to be sufficient, and when it is sprayed on any weed, it defoliates the entire plant and chokes the root in a single application no matter if it is a high growing weed or just budding vegetation. It completely sterilizes the soil and eliminates the growth of any new vegetation from one to five years.

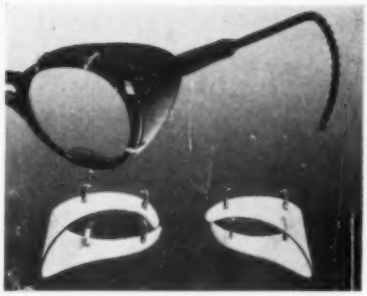
The chemical is easy to use. Results can be obtained whether it is applied by a huge power sprayer or by a hand sprayer can. It is also versatile in that it may be used as a termite insect killer, mold destroyer and wood preservative.

VACUUM-BLOWER

(Use Key # 673 on Inquiry Card on page 75)

PRODUCTION of an all-new model vacuum blower is announced by Multi-Clean Products, Inc. The new unit is known as the F-300 and has a detachable, portable power head and more power. The unit is said to be capable of handling many cleaning jobs from basement to roof, from ceilings, walls and overhead pipes to floors and drains . . . also picking up scrub water or any liquid spillage. The detachable power head and dust bag, weighing 16 lbs., may be carried and operated as a blower or vacuum in areas too small or confining for the vac tank. The high velocity air stream is suitable for blowing out dust, litter and foreign material from motors, sensitive electrical equipment and other delicate or hard-to-get-at places.

The company lists among the new vac blower's construction and operating features a permanently sealed ball bearing power unit with a heavy-duty 1 hp. 115 v. A.C.-D.C. motor, that delivers a forceful, high velocity air stream (220 cfm) for blowing or a concentrated suction of 43 inches maximum water lift; rolled steel 10 gallon tank with easy on-off cover clamps; specially woven filter bag with 1625 sq. in. of filtering area and a 22 ft. 14 gauge, 3 conductor type SJ cord. An assortment of extra attachments is available.



CLIP-ON SIDE SHIELDS

(Use Key # 674 on Inquiry Card on page 75)

ANNOUNCED by the Watchemoket Optical Company are Eye Savers "Clip-On" Side Shields which add deep cup side protection to safety spectacles of almost any size or shape. Molded of clear or green acetate, these side shields are easy to attach and remove by means of positive, nickel-silver clip holders.

For workers who wear safety spectacles, the shields provide greater protection against the many light impact hazards which may reach the eye from top, side or bottom. If prescription safety spectacles are worn outside the shop, side shields can be removed quickly at the end of each day and replaced each morning. They are light and convenient and fit Eye Savers Safety Spectacles (Split Joint Model 80) and practically any other safety spectacle frame.

WATERPROOF SAFETY BOOT

(Use Key # 675 on Inquiry Card on page 75)

THE Tyer Rubber Company announces introduction of a new high quality industrial boot, the Carbon Boot, with special comfort and safety features. The boot has been especially designed for safe, rugged wear in occupations where there is a possibility of injury to feet. It is especially suitable for the fishing industry, refrigeration warehousing, slaughter houses, mining and other work where water-proof comfort and foot protection are required.

The boot features a built-in steel toe and is reinforced at all points of strain. It has a black chevron cleated outsole for good traction, all-'round foxing and a molded heel. It is duck lined, has a sponge cushion insole, and is available in hip and short lengths in many sizes.

EYE SWEEP

(Use Key # 676 on Inquiry Card on page 75)

THE General Scientific Equipment Co. announces a handy, convenient instrument for industrial first aid, of especial use where workers are exposed to flying metallic parts. Called the G-S Eye Sweep, one end is fitted with a magnet for removing steel splinters while the other has a flexible loop for removing cinders, dust and other particles. Sterilization of the instrument will not affect the loop nor diminish the magnetic properties.

ATOMIC PRESS CONTROL

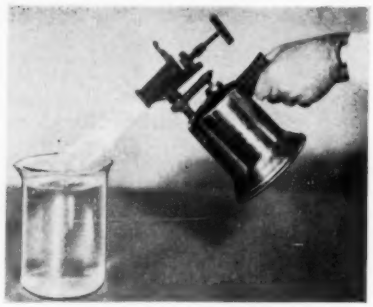
(Use Key # 677 on Inquiry Card on page 75)

ATOMIC research for peacetime purposes has led to the development of an advanced new power-press safety control. Designed and produced by Hazatrol Corporation, the device, called HC Safety Control, embodies the use of radioactive leather wristbands which work in connection with Geiger tubes to prevent the press from working when the worker's hands enter the danger area. The control also insures against the operator removing his "Bikini Bracelets" by use of a time-delay relay which opens the control circuit to make the press inoperative whenever the tubes do not detect the wristbands at a predetermined interval.

A question foremost in the minds of workers and employers alike is "Are the radioactive wristbands dangerous to the operator?" The manufacturer points out that the level is below that considered dangerous. The intensity is equal to .6 REP (Roentgen Equivalent Physical) per week. The AEC and most state agencies have a tolerance (lifetime without effect) of 1.5 REP per week for the hands. The guard does not require adjustment for operator or die changes. One operator can set up a press for blanking, use both hands for holding the stock while making the run, change the dies to a secondary hand-in-die operation, and complete the secondary operation.

The adjustable leather wristbands transmit a steady multi-directional signal which is detected as they near Geiger tubes located at the boundary of the danger zone. The Geiger detectors activate an electronic relay which locks production machinery. The control relay contacts are wired either in the clutch and brake circuit of a friction clutch type press, or to a treadle lock or over-travel device on a fast-acting pin clutch type press. Since the press becomes inoperative whenever the tubes do not detect the wristbands at predetermined intervals, it is impossible for the worker to operate the press without his wrist bands. This same time-delay circuit protects against a possible failure of the Geiger tubes so they will "Fail Safe." An important feature is the fact that radioactivity can be detected even though the material being worked is between the radioactive source in the wristbands and the Geiger tubes on the protective border.

No complex adjustments or mounting schemes are required for installation. The relay unit may be mounted at any convenient location on or near the press. The control box with fail safe and anti-cheat timer is housed in a standard NEMA switch-gear cabinet equipped with aircraft vibration mounts. The Geiger tube detectors are housed in standard "Mougal 1" conduit junction boxes. They may be mounted with pipe fittings. The wrist bands are made of soft leather with adjustable tab buckles and shielded to keep emission at a safe level.

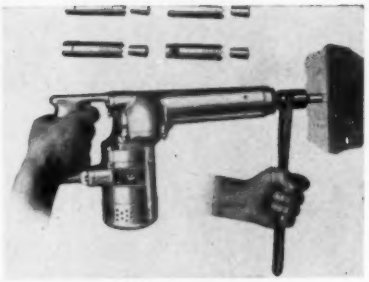


FIRE RESISTANT FLOOR CLEANER

(Use Key # 678 on Inquiry Card on page 75)

THE Hillyard Chemical Co. has produced a new floor cleaner for daily dust-up, under the name of Hil-Sweep. According to the manufacturer, full concentrated solutions of the cleaner proved non-flammable at both ordinary and higher temperatures. It is said that a lighted blow torch applied to the fumes will not cause flame, and that rags saturated with the cleaner will not burn.

In addition, it is claimed that the cleaner will not soften wax film on any surface treatment, eliminating the problem of decreased frictional resistance. Often the use of an improper maintainer will soften the surface treatment or leave an oily residue causing slippery floors. The new cleaner contains no emulsified oils so that it can leave no oily residue to darken, discolor, soften or bleed colors or cause flooring to disintegrate. It is said to be non-injurious to asphalt tile and other resilient floors.



ELECTRIC HAMMERS

(Use Key # 679 on Inquiry Card on page 75)

AN electric hammer for use in conjunction with their self-drilling expansion shells is announced by J. D. Polis Mfg. Company. Called Bulldog Electric Hammers, they are said to drive any size shell in less than one minute. The shells themselves have hardened steel teeth which eliminate the need for previously drilled holes.

The hammer operates on the compressed air principle and has a pistol grip for easy handling. There are no belts or springs—an air cushion protects gearing and motor parts. Movable parts operate at very close tolerances—in perfect alignment—and bearings are "Sealed Type," lubricated for life.

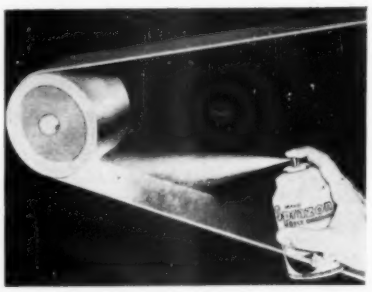
SPRAY BELT DRESSING

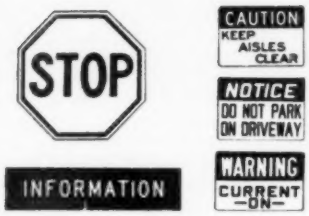
(Use Key # 680 on Inquiry Card on page 75)

THE operator's safety is assured with belt dressing applied from a pressure container. There is no danger to hands and arms as spray is directed from a point away from moving belts and pulleys. Drives need not be shut down for application, claims Graton & Knight Co. in announcing GRAKO SPRAZON Belt Dressing.

New Spraytainer package holds 12 oz. of dressing and operates by a finger valve. Contains enough liquid to treat approximately 350 square feet of belting. The dressing is a clear liquid leather preservative for power transmission belting. It contains no rosin or other injurious material. It lubricates the leather fibres, keeps belts pliable, resilient—and imparts a high coefficient of friction which stops belt slip.

Application in the form of a powerful spray has advantages beyond the safety feature. Treating the face of the smaller pulley (where slippage occurs) is the ideal method to insure even dispersion of dressing, with quick improvement in power transmitted. This has been impracticable with liquid or stick forms, but is now possible with spray form. Belts and pulleys in inaccessible places can be treated quickly, easily and safely.





INDUSTRIAL SAFETY SIGNS

(Use Key # 681 on Inquiry Card on page 75)

A LINE of industrial safety signs has been introduced by Sargent-Sowell, Inc. Including standard and special warning signs, danger signs, traffic signs, civil defense signs, etc., they are available in several sizes and in the color appropriate to the hazard. The signs are in various shapes, have a baked enamel finish and are painted on USS No. 16 ga. steel. They are also available surfaced with reflectorizing beading for higher visibility at night.

Also featured is a line of engraved plastic signs, available with white lettering on a black background, black lettering on a white background or white background with red lettering All signs have many standard wordings, and may be had with special wording as desired. They are said to be of sturdy construction, made to last and keep their finish.

UNDERGROUND LEAK DETECTOR

(Use Key # 682 on Inquiry Card on page 75)

A NEW type of instrument designed to eliminate many of the problems in locating gas leaks from underground pipe lines has been introduced by Mine Safety Appliances Company. Called the M.S.A. Gascope, the instrument has a dual function. It incorporates two separate principles of combustible gas detection, and can analyze accurately a complete range of gas concentrations, below and above the explosive limits. It is no longer necessary to dilute those concentrations that are too "rich" in gas for reading.

With the new instrument, it is possible to pinpoint any underground gas leak without digging up the pipe. It incorporates an electrical range multiplier, and, although it performs the dual function, the controls remain almost as simple as those on earlier combustible gas detection instruments.

For measurement of gas concentrations below the lower explosive limit, the instrument utilizes the combustion principle —gas in the sample is burned on a detector filament which forms part of a balanced electrical circuit. The unbalance, as shown on a meter, is in direct proportion to the concentration of gas present in the sample. To measure higher concentrations, too "rich" with gas to burn, the thermal conductivity principle is employed. This involves use of another filament which also forms part of a balanced electrical circuit. The higher heat conduction rate of gas surrounding the filament serves as the index of concentration percentage. Only one switch is used to change from one range to the other. Flashlight dry cell batteries are used for electrical energy. No valves have to be coordinated with switch operation and the gas samples, taken into the instrument, pass over both filaments in series.

AUTOMATIC MESSAGE REPEATER

(Use Key # 683 on Inquiry Card on page 75)

A WARNING device which automatically and continuously repeats messages of from 15 seconds to 15 minutes has been developed by Cousino, Inc. The Universal "300" Audio-Vendor, when used with any tape recorder and sound amplifier, can be activated by a photo-electric cell, floor mats, or drive-way hose. The speaker can be placed in the most effective location and warning messages recorded to suit each situation. Truck drivers can be warned of pedestrians, low overheads and sharp turns; punching a time clock can remind workers to don safety goggles; fire-control doors can be made to keep "talking" until they are closed; and people entering zones where no smoking is allowed can be ordered to put out cigarettes. Plants with public address systems can also use the unit for messages and emergency warnings. The magnetic tape comes from the center of the magazine and is retrieved and automatically rewound on the outside after recording.

It may also be used to emit frequency notes, to trip various relays and activate electronic controls in proper sequence for operating automatic machinery. Tapes carrying these recorded frequencies can be filed for future use. New messages, as recorded, automatically wipe old messages from the tape.

GLOVES WITH SAFETY SLOGANS

(Use Key # 684 on Inquiry Card on page 75)

KEEPING pace with new ideas to encourage the promotion of safety measures, the Fairfield Glove Co. has announced a free service to industry providing for the inclusion of safety slogans on cotton and leather-palm industrial work gloves. Other slogans are also available which include maintenance, housekeeping, economy of materials, workmanship and mysterious disappearance.

Safety slogans are printed directly on the gloves, according to customer specifications. Some slogans already in use are: Don't Be Sorry—Be Safe!; Be Careful—Live Longer; Are Your Goggles ON?; Protection Pays; Ouch! It's Hot; Think First.

OIL-DISSOLVING HAND CLEANER

(Use Key # 685 on Inquiry Card on page 75)

BASED on a new principle in detergency, the hand cleaner produced by Lixoil Laboratories and called Lixoil is now available in many sizes of containers. It is said to remove cutting-oils, grease, paint, tar, pitch, putty, kerosene, gasoline, asphalt, etc., without irritation, helping to eliminate many industrial dermatitis problems.

The cleaner may be used with warm or cold water, and obviates the use of irritating solvents for cleaning the skin. The cleaner is now available in a variety of sizes—8 oz. bottles; pint bottles; gallons; 5-gallon; and in 55-gallon drums.

GLOVE SELECTOR

(Use Key # 686 on Inquiry Card on page 75)

A NEWLY-DESIGNED industrial glove selector distributed by the Surety Rubber Company, shows at a glance the correct glove for industrial needs by rating the gloves according to their resistance to various kinds of destructive elements.

The compact, pocket-size slide chart, measuring 8½ x 3 inches, shows how each type of Surety industrial glove—Sureseal, standard synthetic and natural rubber—stands up against more than 70 different kinds of acids, oils, solvents, chemicals, abrasives and natural elements. In addition, the chart recommends the gloves according to performance where the resistance factor is negligible between gloves or in cases where the gloves are to be subjected to more than one destructive element on the job. The information is based upon laboratory tests—pressure needle and immersion—and extensive user experience.

QUICK-SETTING ANCHORING CEMENT

(Use Key # 687 on Inquiry Card on page 75)

A FAST-SETTING cement for anchoring all types of machinery, handrails, seats, fixtures, posts, instrument panels, etc. is available from The Garon Products Co. Called GARONITE, it has been developed as an anchoring medium for any type of machinery or concrete installation, including heavy-duty vibrating equipment. It may also be used for patching concrete floors or other repairs of emergency nature.

The compound is applied cold by adding water, and permits use of machines in 30 minutes to 1 hour, depending upon size and weight. At 1 hr. compression strength is guaranteed to exceed 5000 p.s.i., increasing to more than 12,000 p.s.i. full strength. The manufacturer claims that it provides an absolutely shrink-proof union between bolt and base which assures permanent, trouble-free anchorage.

WATERPROOF RESURFACER

(Use Key # 688 on Inquiry Card on page 75)

A NEW process for repairing and waterproofing sidewalks, loading docks, stairways, ramps, driveways, window wells and other outdoor surfaces is announced by The Monroe Company, Inc. Said to be easily utilized by any maintenance man, the process is reputed to solve the long-existent, troublesome problem of water leakage into basements or buildings adjacent to or below sidewalks or other traffic areas. Waterproofing effectiveness of the process is attested by its frequent utilization for the re-lining of swimming pools.

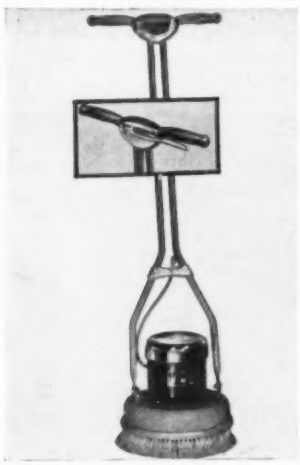
Basis of the process is a recently introduced material known as the Victory Resurfacer. Scientifically factory-proportioned, the unit is ready for application with the addition of water. According to the manufacturer, it is effective for the breakage or deterioration of glass prism settings, and can be used either for entire floor surfaces or for patching. Eliminating the need of removing or chipping the old sidewalk or surface, the compound may be laid in sections without stopping normal operations, and it is said to be ready for use in 24 to 36 hours after application and to withstand the heaviest traffic. The material is said to be slip-proof whether wet or dry and to possess long service life. It will not soften in the presence of heat from sunlight.

What's YOUR Problem?

- **Has an accident or fire interrupted production?**
- **Want to know how to prevent it?**
- **Do you need background information on equipment for industrial safety, hygiene, or maintenance?**

As a service to its readers, "Safety Maintenance" will arrange to supply manufacturers literature on the following subjects. Just insert the key number on the Readers Inquiry Card on the opposite page and be sure to fill in your name and address. If you need information on a specific type of product, simply write it in on the Inquiry Card.

Key Number	Subject
101	Safety Goggles
102	Face Shields
103	Lens Cleaning & Anti Fogging Equipment
104	Sweatbands
105	Hard Hats
106	Respirators & Masks
107	Protective Clothing
108	Women's Protective Clothing
109	Safety Belts
110	Safety Gloves
111	Safety Toe Shoes
112	Safety Boots
113	Wooden Sole Shoes
114	Anti-Slip Soles
115	Oil-Proof Soles
116	Welding Helmets
117	Welding Curtains
118	Protective Skin Creams
119	Skin Cleansers & Soaps
120	Hand Drying Equipment
121	Sanitary Drinking Cups
122	Athlete's Foot Control
123	Salt Tablets
124	Noise Control
125	Antiseptic Medication
126	Burn Medication
127	First Aid Kits & Supplies
128	Stretchers & Litters
129	Resuscitators
130	Portable Ventilators
131	Dust & Fume Collectors
132	Carbon Monoxide Control
133	Fire Extinguishers
134	Safety Cans
135	Fire Pump Equipment
136	Alarms & Warning Lights
137	Safer Solvents
138	Flammable Liquid Pumps
139	Explosion-Proof Lights
140	Safety Gasoline Tanks
141	Anti-Slip Flooring
142	Anti-Slip Waxes & Finishes
143	Floor Cleaning Products
144	Floor Machine Equipment
145	Oil & Grease Absorbents
146	Paints
147	Ladders & Safety Devices
148	Scaffolds
149	Work Platforms
150	Fluorescent Lamp Guards
151	Machine Guards
152	Power Press Feeders
153	Safety Signs
154	Aisle Marking Equipment
155	Safety Awards & Emblems
156	Employee Safety Guide
157	Hand Tools



FLOOR MACHINE HAS SAFETY SWITCH

(Use Key # 689 on Inquiry Card on page 75)

ALL floor machines made by the Hild Floor Machine Co., including the Model K, are now equipped with an automatic safety switch. It is of the "momentary contact" type which turns on the current when the switch lever is pressed against the handle grip, and instantly shuts off current when the operator lets go of the grip. This means that the machine cannot be accidently plugged in with the current turned on. It eliminates the risk of damage to property or to the machine itself, and the danger of injury to bystanders.

The Model "K" is equipped with a powerful ⅓ H.P. heavy duty vertical motor which requires no lubrication. The 12½ inch brush spread and brush speed of 210 r.p.m. assure lively action for a hard finish on all waxed surfaces. Attachments are available to scrub, wax, polish, buff, sand and steel-wool floors of all kinds.

FREE BULLETINS & CATALOGS

As a convenience to executives, these new publications of manufacturers are offered by the Reader Service Department of SAFETY MAINTENANCE & PRODUCTION. To obtain copies write in the key numbers on the free-postage card below.

FIRE PROTECTION

Dry Chemical Extinguishers 465
C-O-Two Fire Equipment Co. The unique design and ease of operation and maintenance of their 20 & 30 lb. dry chemical extinguishers are stressed in clearly explained and well illustrated folder, which shows how extinguishers are engineered to overcome former difficulties.

Fighting Fires in Printing Plants . 466
Walter Kidde & Co., Inc. Built-in carbon dioxide extinguishing systems for gravure, black and white, and magazine printing presses to solve increased fire hazard of quick-drying agents in inks is subject of 16-page brochure. Fully illustrated with photographs and engineering drawings.

FIRST AID

First Aid Units & Kits 467
E. D. Bullard Co. New 6-page catalog of 16 kits, including new fire department and pocket kits, and 70 different first aid unit packs. Accompanying data sheet suggests what items are needed for kits in various industries and types of transportation.

Snake Bite First Aid 468
Pac-Kit Co. An informative pocket folder warns against the hazards of poisonous snakes, describes 4 common species and how to tell the harmful from harmless types, and shows in detail how to apply the suction type of first aid. The snake-bite first aid kit is approved by Sportsmen's Research Institute.

Medical References on Resuscitation 469
J. H. Emerson Co. A bibliography of articles dealing with medical research on resuscitation, especially by mechanical equipment. References are arranged under 4 general headings: Safety, Effectiveness, Pressures, and Effect on Circulation.

PERSONAL PROTECTION

Protection of Foundry Workers.. 470
Safety Clothing & Equipment Co. Illustrated folder shows various types of protective clothing for foundry workers. Items made from leather, asbestos, fireproof duck and neoprene include leggings, spats, coats, aprons, pants, sand-blast helmets, hand pads, gloves, etc.

Rubber & Neoprene Footwear .. 471
Beacon Falls Rubber Footwear. A new type of insulated, 4-buckle boot for protection against the cold is featured along with an insulating plastic-foam sock in a folder that also shows a full line of rubber and neoprene boots, rubbers and pacs, with or without steel safety toes.

Universally Fitting Goggle 472
Willson Products, Inc. A unique hinged bridge, along with specially designed temples, permits this one-size goggle to fit all faces, according to an illustrated bulletin, which gives full details on the hardened glass lens, plastic frame goggle with removable side shields.

Gas Mask Valve Protector 473
Acme Protection Equipment Co. Illustrated bulletin outlines how a protective unit eliminates the hazards of frozen mask valves and also valves curled by use in solvent vapors. Includes full directions for attaching the protective unit.

PERSONAL HYGIENE

Hand Cleanser for Office Workers 474
G. H. Packwood Mfg. Co. Bulletin outlines characteristics of powdered, borax-type cleanser for office and light manufacturing workers: entirely water soluble, emollient fortified, free rinsing, thorough and economical. Bulletin also lists dispensers; heavy duty, waterless, and maintenance cleansers; and ink cleansing cream.

Soap Dispensing Equipment 475
Bobrick Manufacturing Corp. An 11-page manual of architectural specifications for soap dispensing equipment, including individual wall-mounted dispensers, gravity feed soap systems, lavatory mounted dispensers, and hospital type dispensers. Manual is indexed for quick reference.

Paper Cups as a Safety Tool ... 476
U. S. Envelope Co. "We find paper cups one of the most effective tools in our employee health and safety program," is the title of this small folder that shows how paper cups with imprinted safety messages reduce accidents and absenteeism and improve health and morale.

Comparison of Cleanliness 477
Chicago Hardware Foundry Co. A reprint of a Public Health Report showing a clinical comparison of the sterility of the hands after drying with sterile towels and with electric hand drying equipment. Cost comparisons of the 2 methods also shown.

BUILDING MAINTENANCE

Long Wearing Waxers & Mops.. 478
E. I. Du Pont De Nemours & Co., Inc. Educational folder explains the properties and efficiency of cellulose sponge yarn mops for industrial and institutional waxing and mopping. Care of mops outlined.

Stair Treads & Ladder Shoes ... 479
American Mason Safety Tread Co. Fully illustrated 8-page bulletin on several types of anti-slip metal treads, including ribbed and abrasive metal. Drawings give full data on sizes and styles. Information on repair of worn stairs and on ladder shoes also given.

Floor Sealer 480
West Disinfecting Co. Folder shows how Lastincote floor sealer, for wood, cement or linoleum surfaces, seals the pores against oil, acid, dirt and grease, and dries to a hard, durable, shiny finish.

Combination Scrubber-Vacuum Machine 481
Finnell System, Inc. Illustrated literature describes single machine that applies

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SEPTEMBER 1954

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Free Bulletins (Cont'd)

cleanser, scrubs and picks up in one operation. Gives specifications, and also methods of floor cleaning, including oily floors. Small and large models shown, gasoline powered as well as electric.

Non-Slip Gratings 482
Bustin Firm-Grip Grating Corp. Open-metal gratings with non-slip surface construction are shown in this folder. Emphasis is on safety and versatility of product in such uses as platforms, manhole covers, flooring, stair and ladder treads, ramps, scaffolding, oil rig ladder rungs, mats, etc.

MISCELLANEOUS

Sound Measuring Instruments ... 483
General Radio Co. If you have a noise problem, and who hasn't, here's a 12-page brochure that offers basic but concise information on sound measuring equipment. Pictures and full specifications for sound-level meters and calibrators, sound-survey meters and analyzers, vibration meters and analyzers, and other accessory devices.

Carbon Monoxide Detector 484
Taller & Cooper, Inc. Illustrated bulletin describes a compact, portable unit to analyze air automatically for carbon monoxide and to control ventilation equipment in garages, mines, factories, chemical plants, etc.

Vacuum Sheet-Lifter 485
F. J. Littell Machine Co. Bulletin describes a compressed-air operated vacuum-cup device for safely and easily lifting sheets of steel, even when oily. Specifications given and use fully illustrated.

Powder-Actuated Stud Driver ... 486
Velocity-Power Tool Co. Details of design, operation and application of a U.L. approved powder-actuated tool for driving steel studs into steel, concrete or masonry are given in a 4-page bulletin.

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(For details, use Key # W-39 on card on page 75)

Thantis® LOZENGES

first aid for throat irritations

SORE THROATS due to coughs and colds, if neglected, may result in lost man hours of work.

THANTIS® Lozenges contain no antibiotic; they produce no unpleasant by-reactions in the mouth.

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Twenty-three years' extensive clinical and lay use has proved the safety and effectiveness of this popular product.

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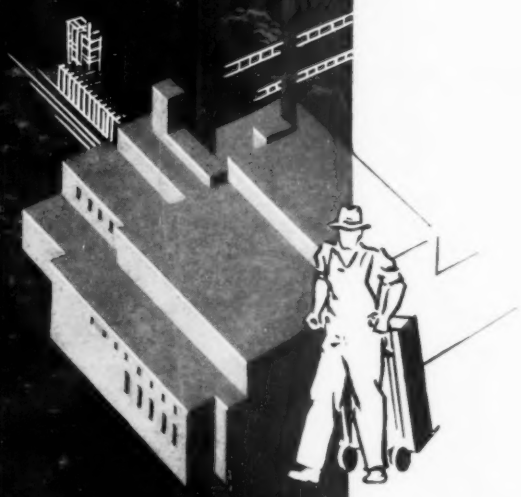

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First aid for wounds . . .

Neglect may cause infection which can be prevented by prompt use of 'Mercurochrome.'®

No antiseptic has been proved to be more effective than 'Mercurochrome' for topical appiication.

HYNSON, WESTCOTT & DUNNING, INC., BALTIMORE 1, MARYLAND

(For details, use Key # W-40 on card on page 75)